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

convenes the

WORKING GROUP MEETING

ADVISORY BOARD ON

RADIATION AND WORKER HEALTH

SEC ISSUES

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held at the Holiday Inn Airport, Erlanger, Kentucky, on November 17, 2006.

C O N T E N T S

November 17, 2006

TRANSCRIPT LEGEND

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-- (sic) denotes an incorrect usage or pronunciation of a word which is transcribed in its original form as reported.

-- (phonetically) indicates a phonetic spelling of the word if no confirmation of the correct spelling is available.

-- "uh-huh" represents an affirmative response, and "uh-uh" represents a negative response.

-- "*" denotes a spelling based on phonetics, without reference available.

-- (inaudible)/ (unintelligible) signifies speaker failure, usually failure to use a microphone.

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ELLIOTT, LARRY, NIOSH
HOMOKI-TITUS, LIZ, HHS
HOWELL, EMILY, HHS
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MAURO, JOHN, SC&A
MCFEE, MATT, ORAUT
NETON, JIM, NIOSH
ROBERTSON-DEMERS, KATHY, SC&A
RUTHERFORD, LAVON, NIOSH

P R O C E E D I N G S

(8:00 a.m.)

WELCOME AND OPENING COMMENTS
DR. LEW WADE, DFO

DR. WADE: Okay. Good morning, all. This is Lew Wade, and I have the privilege of serving as the Designated Federal Official for the Advisory Board, and I welcome you to a meeting of the working group on SEC issues. That group is ably chaired by Dr. Melius. Members include Dr. Ziemer, Gen Roessler and Mark Griffon. Drs. Melius and Ziemer and Gen Roessler are here in the room. Mark, are you on the phone -- Mark Griffon?

(No response)

I think Mark intends to join us, so we'll ask Mark when he gets on line to mention that. Again what I'll do is we'll go around the table here and identify individuals, and then we'll go out onto the telephone and identify individuals. I'll start by asking, are there any Board members on the call at this point? Any Board members?

(No response)

Okay. This is Lew Wade, I work with NIOSH and serve the Advisory Board.

MS. HOWELL: Emily Howell with HHS.

DR. BEHLING: Hans Behling, SC&A.

DR. NETON: Jim Neton with NIOSH.

DR. MAKHIJANI: Arjun Makhijani, SC&A.

DR. MELIUS: Jim Melius, the Advisory Board.

DR. ROESSLER: Gen Roessler, Advisory Board.

DR. ZIEMER: Paul Ziemer, Advisory Board.

DR. WADE: Now let's go out to the telephone and I'll ask any members of the NIOSH or ORAU team to identify themselves.

MR. RUTHERFORD: LaVon Rutherford, NIOSH.

DR. WADE: Good morning, LaVon.

MS. ROBERTSON-DEMERS: This is Kathy Robertson-Demers, SC&A.

DR. WADE: Thank you, Kathy.

DR. MAURO: John Mauro, SC&A.

DR. WADE: Welcome, John. Any other NIOSH, ORAU or SC&A people on the line?

MR. MCFEE: Matt McFee with the ORAU team.

DR. WADE: Good morning, Matt. Any -- anyone else?

(No responses)

Any government employees who are on this call

by virtue of their employment?

MR. (UNINTELLIGIBLE): Steve (Unintelligible), CDC.

DR. WADE: Morning.

MR. KOTSCH: Jeff Kotsch, Department of Labor.

DR. WADE: Morning, Jeff. Anyone else?

(No responses)

Is Mark Griffon with us yet?

(No response)

Is there anyone on -- on the telephone who would like to be identified, would like to be on the record?

MS. BARRIE: Terrie Barrie with ANWAG.

DR. WADE: Good morning.

MS. BARRIE: Morning.

THE COURT REPORTER: I'm sorry, who was that?

DR. WADE: Could you repeat your name and affiliation, please?

MS. BARRIE: Terrie Barrie with ANWAG.

DR. WADE: Thank you. Now I'd like members of the NIOSH/ORAU team, and I'll ask members of the SC&A team, to identify if they have any conflict. This meeting is really going to focus on Nevada Test Site and Pacific Proving Grounds. So if there are any conflicts in

those areas, I'd like members of the NIOSH/ORAU team and then SC&A to identify.

Are there any NIOSH/ORAU team members on this call who are conflicted at NTS or Pacific Proving Grounds?

MR. MCFEE: Matt McFee. I'm corporately conflicted through MJW and their work at NTS.

DR. WADE: Thank you. Anyone else on the NIOSH/ORAU team?

(No responses)

Anyone on the SC&A team conflicted?

DR. MAURO: John Mauro, no conflict. However, as -- as you folks know, there -- we have put up a firewall to separate work that SC&A is doing on support of the Advisory Board and a contract that SC&A is currently performing for the Defense Threat Reduction Agency, so we are operating under the special firewall. I just wanted to inform the working group of that situation.

DR. WADE: And that firewall is in place and functioning, and there's no prohibition on the people representing SC&A on this call in participating fully.

I don't think there's anything else that we

need to do. I'd ask one more time, is Mark Griffon on the phone?

(No response)

THE COURT REPORTER: Dr. Wade, could I get the name of the person, Steve somebody, I couldn't hear his last name -- on the phone?

MS. HOWELL: From CDC.

DR. WADE: Steve from CDC, could you identify yourself again, please?

(No response)

You might be on mute.

(No response)

You might have decided you were on the wrong call and gone away.

THE COURT REPORTER: He was right before Jeff Kotsch.

DR. WADE: There was a gentleman, first name Steve, with CDC who identified themself.

(No response)

Anyone who identified themself as being an employee of CDC?

(No response)

THE COURT REPORTER: Well...

DR. WADE: Okay. It wasn't a familiar name to me.

DR. MELIUS: Maybe he was on the wrong call.

DR. WADE: Could have been the wrong call, but we welcome even wrong-callers.

Okay. Dr. Melius.

DR. MAKHIJANI: John, did you get the report?

DR. MAURO: I'm sorry, I was on mute. Not yet, but I'll be fine. Don't worry. I'll get it eventually.

DR. ROESSLER: It didn't come through? It said it went out.

DR. WADE: Okay, we're all -- the preliminaries are done.

"PARSING HEALTH ENDANGERMENT CRITERIA"

DR. MELIUS: Okay. This working group is set up to review the -- particularly the issue of the people that were exposed during Nevada Test Site, Pacific Proving Ground for less than 250 days and hence didn't qualify for the Special Exposure Designation for those two sites. In order to work in this area, we've had discussions and had SC&A do some work, and we have two reports from them that we will be discussing this morning. The first one is called "Parsing Health Endangerment," which I think everybody here got earlier in the week --

past couple of days, Arjun sent out. The second one is called "Health Endanger Assessment for Nevada Test Site Special Exposure Cohort," which is a -- sort of a draft of a paper that Arjun and -- and others at SC&A have been working on and was sent to us last night and most of us got it as a hard copy this morning for the first time to -- to look at.

DR. ZIEMER: Could I ask a question? Was that distributed also to the Nevada petitioners? For example, did Terrie Barrie get a copy of that?

DR. MAKHIJANI: No, I -- I did not have their e-mails on the distribution list. I guess I should have thought of that.

DR. ZIEMER: Well, we probably should get a copy of that to the petitioners, should we not?

DR. WADE: Did you send a copy to Jason Broehm? You would not have done that.

DR. MAKHIJANI: No, I just sent it to the working group and to Larry and Jim, Stu Hinnefeld, and I believe to you, Dr. Wade.

DR. WADE: Yes, I have it. Okay, let me --

DR. ZIEMER: Well, Terrie is on the line. We can probably get her e-mail address --

DR. ROESSLER: Get her e-mail address and I'll send it.
DR. ZIEMER: We can send it, Terrie, if that's agreeable.
MS. BARRIE: Yes, Doctor.
DR. WADE: Terrie is willing to put it on the line?
MS. BARRIE: (Unintelligible)
DR. WADE: Terrie, would you be willing to give your e-mail address to us so we could send you a copy of this?
MS. BARRIE: Sure, it's T-as-in-Tom B-as-in-boy a-r-r-i-e@yahoo.com.
DR. ROESSLER: I'll try to send it as an attachment.
MS. BARRIE: Okay, that would be perfect.
DR. ZIEMER: It's 60-some pages -- 67 pages, so it's fairly lengthy.
DR. WADE: Now does Terrie have the first of the two documents, the "Parsing Health Endangerment Criteria"?
MS. BARRIE: No, I don't.
DR. WADE: So, Gen, if we could impose?
DR. ROESSLER: I'll send them in two separate e-mails because they're both rather large.

DR. WADE: Uh-huh. It's on its way, Terrie. It might take time because it's big and it's cold here.

MS. BARRIE: Okay, thank you.

DR. MELIUS: I thought how we would proceed would -- is to first have Arjun sort of walk us through the first paper, the "Parsing Health Endangerment Criteria," 'cause it was -- and my plan was that -- what I wanted to -- hoped we could -- is to have some discussion of sort of the general approaches that might be used for addressing this issue and how we might make decisions, and then move into talking about individual sites. But it's not clear that we'll have time this morning to deal with individual sites. And some extent, how we deal with individual sites will depend on how we look at criteria and how -- how we approach the problem. So I think most of the focus will be sort of more in a general sense and seeing what we can accomplish there. So I thought that Arjun did a good -- very good job of putting together sort of a background for how to think about that and focus based on -- on the -- on the current regulation that NIOSH has for

health endangerment.
So Arjun, if you don't mind --
DR. MAKHIJANI: Sure.
DR. MELIUS: -- you want to take over and walk us through that?
DR. MAKHIJANI: Well, I -- what I did was I started with -- with the paragraph in 42 CFR 83 that -- that deals with health endangerment, or two paragraphs, but there's one specifically that deals with those who have worked less than 250 days. And I broke that up into -- the reason I called it parsing is I broke that up into -- one, two, three, four, five -- five bullets, five separate items for analysis. And the five items that I looked at in that paragraph that might make people that worked less than 250 days eligible for inclusion in the Special Exposure Cohort were that they would have exposure to radiation during discrete incidents.
The other one was they were likely to have involved exceptionally high exposures, such as nuclear criticality incidents or other events involving similarly high levels of exposures. Then there was a question of that the exposures

would result from the failure of radiation protection controls.

And the rule also says that any duration of unprotected exposure could cause a specified cancer.

And then the criterion for whether an individual should be included was not a dose criterion 'cause you're already past that stage where NIOSH has said they cannot calculate a dose, and health endangerment is the second step to that, was presence during the incidents where the potential exposures could have happened.

So the accent is not on exposures, but on potential exposures, and I tried to indicate that throughout by -- by italicizing potential exposures --

DR. ZIEMER: Can I ask a question here?

DR. MAKHIJANI: Yeah.

DR. ZIEMER: When you're separating this out -- for example, the fourth bullet, "any duration" -- but are -- you're not suggesting, are you, that that be taken by itself? It's linked in the regulation to the discrete event part, so --

DR. MAKHIJANI: Yes, it is. Yeah, yeah.
DR. ZIEMER: -- so when we talk about these we -- we need -- yeah, we can't talk about them exclusively of the other. I just want to make sure that.
DR. MAKHIJANI: You have to put Humpty Dumpty back together in that kind of --
DR. ZIEMER: Taken by itself, the statement "any duration of unprotected exposure" is very different than any duration in a -- in a discrete event.
DR. MAKHIJANI: Right. Right. I think -- I think you have to -- you have to take them together. The "any duration" -- well --
DR. ZIEMER: But we'll get a chance -- we'll get a chance to discuss --
DR. MAKHIJANI: -- Jim might elaborate on that more, but I think any duration within the context of the exposure.
DR. ZIEMER: Yeah. Yeah, obviously.
DR. MAKHIJANI: If there's no exposure, then there's no eligibility.
So the first thing I tried to do was to interpret the term "exposures," and -- and so I tried to separate the question of exposure from

probability of causation, because once you pass the stage of not being able to calculate dose, then you're past the stage of talking about probability of causation. So mainly what I did in that section was to argue that what we're talking about is potential for exposure, and then that would be linked to the other clauses, potential for exceptionally high exposures such as during criticality accidents. But so far as individuals are concerned, you're talking about whether they -- they had a potential to be exposed to those kinds of incidents or not. And I suggested that the 250-day problem -- exposure potential might be considered in two categories: Exposure potential that arises from facilities where sources -- sources are present during the entire work day and throughout the year without incidents. So here, if -- if there are no incidents, then presumably you would not fall within the rule. You're just in a uniform radiation working environment where there might be a source, and your working there is a normal part of your employment. And then there's a question of exposure potential that arises from incidents,

and what I suggested is that health endangerment within the context of the rule is really only in that second context, within the context of incidents.

We -- I think we had handed out previously a paper by Mike Thorne which drew on a Los Alamos summary of criticality accidents throughout the world. That paper is appended in full, but I had Bob Barton in the SC&A office reorganize all that information into tables that would be more directly applicable to the way the rule is written, and those tables are shown in Table 2, U.S. criticality accidents and Russian criticality accidents and accidents in other countries.

I did this to be able to get a sense of what is the range of doses. You know, what does it mean, exceptionally high exposures such as those during criticality accidents? It turned out that this actually, in my opinion -- in our opinion -- we discussed this in SC&A quite a bit. It didn't seem as useful as it might be at first sight. You think criticality accidents always had very high exposures, but they don't. They might be exposures from less

than a rem to 10,000 rem, so you've got exposures all over the map. So then you're left with a significant problem of how to define exceptionally high exposures, since that's the only example that's given in the rule and everything else is similar to criticality exposures. And I think I made a table -- Table 1 on page 4 is a very brief summary. It talks about the duration of the incident.

Now the duration of the accident itself is usually longer than the duration of the exposure, because workers would usually evacuate. And so the -- the ranges of doses in U.S., Soviet and incidents in other countries -- again you can see it's -- it's -- typically the ranges have been similar, independent of geographic location or whether it's here or in some other -- other nuclear establishment. And the duration of the accidents are from very brief to over 30 hours, so nearly a -- a working week.

So that gives some idea of the range. Now -- so you're left with the problem of then discovering what high exposure might mean, and

then exceptionally high exposure. And so I argued that you eliminate less than one rem or less than a few rem as high exposures, because the ICRP standards for workers are two rem per year. They've not been adopted here in the United States. The then-prevailing standards were three rem per quarter and five rem per year.

So I think -- part of the suggestion for discussion is is that the kind of frame of reference that should be suitable for high exposures. At the time, for instance, at the Nevada Test Site when people exceeded three rem per quarter, they asked for special permission to exceed that dose. So whether a few rem, five rem or something more than that ought to be considered as high exposures -- well, we question -- it certainly is within the range of criticality. Then there's a question of what does "exceptionally" mean. And in the context of the nuclear weapons context, certainly I think most people were not exposed to five rem or more, and so it would be exceptional in that sense. But whether it's exceptional in the context of high exposures, I don't know. So

it's kind of -- it's -- it's really --

DR. ZIEMER: At what point do you want to discuss that?

DR. MELIUS: Let's -- yeah.

DR. ZIEMER: Well, whether you're talking about the two rem or the five or the three per quarter, those are in the context of controlling lifetime exposures.

DR. MAKHIJANI: Right.

DR. ZIEMER: For example, the three rem per quarter, typically you could get that as long as your lifetime exposure -- they used to use the five times *n* minus 18. So a single exposure of three rem -- at least in the health physics field -- you'd -- I'd be hard-pressed to find anyone who would consider that high exposure. It would be the issue of if you got that three rem every quarter for a certain number of years and -- and there the concept was you don't want to do that every quarter, which would be 12 rem a year, for years. But you could do it until you reach that point where you caught up with the five times *n* minus 18 curve, and then that dropped you back. But -- and now I think probably -- we've become

more conservative, obviously, on this. And now the two rem per year and now some people use your age as a lifetime limit. You don't want to -- which really, in a sense, comes down to one rem per year. But whatever it is -- but -- but exceeding it for one year, I think -- to me, conceptually, you'd be -- it would be hard to argue that that's a high dose in terms of contribution to a probability of some health effect. It's -- it's -- if a person's getting two per year for lifetime, certainly compared to old standards that still is awfully low. I mean -- what, used to be 15 a year and people -- I don't know if we argue. Now very few people reach that, but in the early days a lot of them did. And I think by today's standards we would say that 15 a year for ten years is high.

The other part of it is that, talking to radiobiologists, I think they still -- most of them argue that in any event, to show health effects below about ten rem is pretty speculative.

DR. ROESSLER: In fact, the Health Physics Society has a position statement out stating

that below five rem there is no evidence in any scientific studies of any health effects. And I think that's a general consensus among scientists in the field is that there -- there's no evidence below five rem of any health effects.

DR. MAKHIJANI: Well --

DR. ZIEMER: Five or ten, but it's ball park, it's --

DR. ROESSLER: Yeah.

DR. MAKHIJANI: I have a question about that. This is -- this is the first controversy that spans the decades, and the question that's been examined by the ICRP, by the NCRP and the National Academy in the last five years. I think NCRP in 2002, ICRP a little bit after that -- I don't know if that rep-- the draft was finalized or not, I don't remember -- and the BEIR VII report of course came out in 2005, last year, and -- and was published actually this year. So this -- this position of the Health Physics Society is really at variance with -- with those findings.

When -- when people say "evidence" in the Health Physics Society context, I think they

mean epidemiological evidence. And when I talk to epidemiologists who are frank about their profession and tell you that you can't be sure in epidemiology until people are dropping like flies and -- otherwise it's a statistical art. And the way I understand BEIR VII is they've taken into account cellular level evidence that -- there's a lot of evidence. Now -- so it depends on -- then you're -- you're not into the what's a high exposure; then you're into the meaning of what's evidence. And for me, I think -- I find it surprising that industry and Health Physics Society would consistently reject what have been the most thorough international investigations into the health risks -- cancer risks of radiation, which all adopt a linear -- it's not that it's certain there's a linear no-threshold, but it's regarded as the best working hypothesis under the circumstances. So I -- I find it -- I find it kind of --

DR. ZIEMER: Well --

DR. MAKHIJANI: -- difficult to put this discussion in that context.

DR. ZIEMER: Right. The linear hypothesis

really is a practical thing to use for radiation protection work. And I think it's quite true in epidemiology -- you know, they say that a biological catastrophe is one that's so bad that even an epidemiologist can see it. And epi studies don't answer either the -- the linear no-threshold question. And I think the ten or five rem, whatever it is --

DR. ROESSLER: It is ten, I just looked at that.

DR. ZIEMER: -- yeah, it's very -- it's very hard -- it's very hard to see that, even in epi studies. And you -- you really end up saying are there effects, can -- even in biological experiments, and special sensitive groups and so on. And yeah, there are some special cases where you can actually observe them, but if you can't observe the effect in a human population -- if you can't observe it, then it's pretty hard to argue -- it's pretty hard to argue that it's -- that it's there. And there -- you know, even -- even with the linear no-threshold thing -- with the linear no-threshold thing, it -- there's some point at which you -- you simply can't observe it. I mean otherwise you

get into the one gamma ray issue business, you know, if you want to carry it all the way --

DR. MAURO: This is John Mauro. I'd like to sort of step in a little here also.

DR. ZIEMER: Yeah.

DR. MAURO: I notice we're -- we're thinking about this criteria within the context of what levels of exposure where there's clear and unambiguous evidence of some adverse effect. I certainly agree that's one line of -- of attack on how do you develop criteria. And certainly five, ten rem is in the appropriate area, not only for the acute effects of radiation where you start to see drop in white blood cell count, but also in terms of the chronic effects where you start to see a statistically significant increase. But the other side -- I mean another tack, and I don't know whether or not it is an appropriate tack, but is asking the question if an individual were exposed -- let's use the number ten rem -- is it -- is it possible that that type of exposure could result in a probability of causation in excess of .5 for a given exposure -- condi-- condition -- a given scenario and cancer. So I mean that

-- that's sort of like another way to come at this; that is, thinking in terms of well, what -- what types of doses does it take to end up with a PC of .5 -- and that seems to be the one that is, in my mind, at play here, only because of parity issues. That is -- the way I'm looking at it is if you have an individual that's exposed to a level over the course of greater than 250 days and -- and you compensate, why would you discriminate against the person who gets the same dose in less than 250 days and not compensate? That -- that's another tack that I think is worthy of discussion.

DR. ZIEMER: And I agree with that issue, and I was simply making the argument that if -- if we're trying to isolate a number and sort of argue from that point of view that there's inherently some effects and therefore we should use that as a criteria, I think it may make a lot of sense to take a number and see what you get in the probability of causation calculation. Now -- keeping in mind that when you do that and -- and I don't know, when you assume this theoretical number, what you do

about -- are you going to take a point value and what are you going to do about a distribution --

DR. NETON: There's the problem.

DR. ZIEMER: -- because in -- in the -- in the case of those individual workers who are put through the system with a dose reconstruction, we're typically saying, in effect, their dose may have been as high as some number which is very much above whatever that value is because of the distribution of uncertainty.

DR. MAURO: Right.

DR. ZIEMER: I mean their official number may be ten rem, but if you go out to the tail, that POC that we look at probably is associated with -- who knows, 40, 50 rem probably.

DR. WADE: Jim.

DR. ZIEMER: So what do we do on the point values.

DR. NETON: I think the -- we hit right exactly very quickly on the basic issue here. We debated early on in this regulation as to is there a number, is there ten rem, 15, 20, what is it. And you quickly run into an issue that is what number do you use to -- to bracket that

50 -- if you use 50 percent as a PC. And the way the regulation is structured, if you cannot reconstruct dose for any particular cancer, then they're all in. That's the way it's worked.

DR. ZIEMER: Yeah.

DR. NETON: So essentially what you end up having to do is establish a three-dimensional matrix where all cancers or all the variables in the probability of causation calculation against all variable of dose to try to find what the lowest possible dose one could arrive at to get to 50 percent. Well, then you've got variables in the probability of causation calculation -- latency, date of diagnosis, you know, sex, all these other variables -- and then the variables in the dose calculation. And it's -- it's, in my mind, a very -- it's not practical. It cannot be practically implemented in that way. You just -- I don't know that you can solve it. You can't say like leukemia you would think a priori is probably one of the lower ones. You can -- we've compensated people in this program for two, three rem exposures to leukemia. On the other

hand, solid tumors are in the multiple tens -- 50, 60 rem, 100 rem for lung cancer. But what combination of age and sex and exposure and -- and solubility type -- you know, I don't know how you could optimize that to come out with the answer on a particular case, but -- and then you run into the issue of now -- now you know I've got the dose.

Say we could even solve that, now you've got the exposure time. If you take a chronic exposure like an internal dose, am I going to make the cut point one hour of exposure, two hours, five hours? I mean I -- it's a very difficult problem.

So what we ended up with in the regulation was sort of a dichotomous situation; 250, which very much parallels the original SEC. And then the intent was that you could identify -- it was fairly obvious, if these large exposures were so far out of the realm of this chronic, 250-day type situation, that we would treat them separately. And that would be a -- a criticality, say, for example; and exceptionally high, where radiologic controls failed, were -- were meant to be fairly

obvious, that even anyone looking at that would say the PC is clearly over 50 percent without even running a calculation. That was sort of the way it was structured.

So we're back to where we were three or four years ago now, trying to figure out possibly a way to come up with a finite number that one can use as a litmus test. And I -- I'm all ears. It's a -- it's a difficult problem.

DR. MELIUS: But -- but I'm not sure we can -- can do that, partly because, number -- the test for getting in here, the first step is that you can't reconstruct dose. So even if we come up with a number, how close are we going to be able to, you know, calculate that we're at that number or above that number or below that number for a particular individual? And we're going to -- and some of the variables about how they were exposed and how long they were exposed and so forth is going to be also very unknown, or we're going to be -- you know, have very limited information on that. And I think some of the situations that we've heard about at Nevada Test Site and other places is just there's a lot of uncertainty -- how much

time did they spend there, exactly where they were in relationship to -- to exposures and so forth. We're not going to have either and -- and you know, I just wonder if we're better off trying to come up with some sort of qualitative way of -- of making those assessments. But even that's going to be difficult because, you know -- well, does that only apply to people that, you know, were there for a certain time period or, you know, two days, five days, what -- whatever. I mean it's very (unintelligible) a real mix and we may not have the records to even support that kind of distinction.

But -- but I do think what Arjun's getting at is helpful in the sense that we need to figure out what do we mean by "exceptionally high exposures" and -- and maybe in retrospect, did we mean all criticality incidents, in which case we're talking about a --

DR. NETON: This -- this was intended to be a qualitative definition.

DR. MELIUS: Yeah.

DR. NETON: I mean, you know, exceptionally high is sort of qualitative. It (unintelligible) --

DR. MAURO: This is John Mauro. Let's say for the moment we agree that it's a qualitative -- and to pi-- to try to pick a -- a specific number is -- is difficult, and perhaps not what we would li-- are really trying to do. Then the alternative would be is -- well, then let's -- in this particular case, well, let's look at what exposures did occur and -- I mean it's almost as if rather than look-- it's almost an iterative way to look at it, say well, you know, we'll -- we'll just -- we -- we -- we're starting to understand the challenges of trying to pick some numerical criteria. And then we -- then you go back to well, in this particular case, Nevada Test Site, what are the kinds of potential doses that were experienced? For example, are we talking about situations where, by and large, no one got much more than one rem in a short period of time, ten rem, 15 rem? I guess what I'm getting at is I'm not sure if -- if -- if we do move into a qualitative approach, then it really becomes a matter of a collective judgment for this particular site under these particular conditions, does it meet the qualitative standard. So I just throw that

in as a way to not find ourselves gridlocked to try to come up with a number.

DR. NETON: But you still end up with having to -- having to pick a number, John. That's the problem. I mean you can look at the population and say their doses were as high as 50 rem, but then at some point a judgment has to be made, is that the number, is that a number that -- you know.

DR. MAURO: Well, the reason I say this is because, as Arjun pointed out, it's really the combination of five criteria. I mean it's the con-- it's all of those elements that together -- only one of which would be this dose -- that together, when you view that particular site and it -- what transpired there within the context of all of the different facets of the definition, is the judgment made, not -- not based solely on one dimension, namely let's say some dose. So -- so I'm just trying to find a way to come to grips with the problem in a way that is not so -- with -- with such bright lines, because I don't think this is a bright-line prob-- problem that can be solve with bright lines.

DR. MELIUS: But could -- could I just add one thing, though. I -- I think we might actually take and look at a particular site and say that that would have a -- sort of a, you know, a range of exposures. And say again, let's -- Nevada Test Site situations with the above-ground testing that -- that would qualify as exceptionally high. 'Cause remember, we're not going to have the kind of records that are going to, you know, pinpoint that John Smith was there for two hours in a certain spot on a certain day. We're going to have, you know, a range of -- of, you know, poor and -- to, you know, sort of mixed -- you know, very -- not very good information always and -- and so we're just I think trying to put people into categories as best we can, trying to be fair to them and -- and recognize that they -- they were at risk from this -- as much the same way that we're doing with everybody else in this program. I mean we're -- you know, we're not making very, you know, precise estimates, just based on the amount of information that we have and the nature of the situation. And so -- I mean one other approach would be, you know --

again, rather than take it incident by incident, focus -- look, we have this group of people that -- or groups of people that worked at Nevada Test Site or Pacific Proving Ground, whatever; they had -- they were in these situations, do -- do these sort of qualify as exceptionally high exposures and can we somehow group people in a -- in a way that, you know, we think is fair and do -- I think that would make -- take a fair amount of work of trying to understand the nature of the different work groups and what people did at the site and -- and how their employment's described. But -- but I -- but I think we -- I suspect we could come up with a sort of collective judgment that we'd all be fairly comfortable with, much like we do with -- with regular SECs.

DR. NETON: I think we'd have to be a little careful that -- that the class definition that applies the 250-day group might be quite different for a discrete group then.

DR. MELIUS: Yeah.

DR. NETON: I mean if you start narrowing -- you know, the requirement for a discrete is to have this exceptionally high exposure, and you

can't take that and then apply it to the -- the class that was defined for a 250-day exposure 'cause that -- that's essentially anybody who was on site that should have been monitored.

DR. MELIUS: Right.

DR. NETON: Now if one can identify -- and I see there's been some attempt here in the SC&A documents -- to identify these discrete incidents that might have occurred, I think we could maybe agree at some point that there was a discrete incident that occurred and that -- those people involved in that discrete incident may be a member of a class based on discrete exposure. That's what we have to be careful to do. We can't make the whole site a -- everybody involved in a discrete incident. I mean it's --

DR. MELIUS: Oh, yeah, yeah. No.

DR. NETON: -- not the way it works.

DR. MAKHIJANI: If I might say, what I was trying to do and -- well, I'm very glad of the discussion because -- I mean all of the numbers -- I -- I put them out really to be shot down or discussed or --

DR. NETON: Yeah.

DR. MAKHIJANI: -- changed in some way. That's why when I discussed it with John and Joe we thought better to call it working papers because they're going to undoubtedly going to be changed as a result of this discussion, so just -- that was the spirit in which they were offered, not as the normal kind of a report that we present to you intended to be discussed in a Board meeting, because this is more difficult.

The thing that I was trying to do in thinking about this was not in terms of actual exposures of people who were in incidents. The -- what I did -- when I -- when Kathy and -- and Bob Barton and I were looking at this, what we tried to do is to take those incidents and show the radiological conditions, were there failures of radiological control, did somebody do something out of the ordinary that resulted in a high exposure -- like this person that wound up at ground zero and refused to leave and got 39 rem and then two people went after him and they got more than ten rem. Well, clearly that didn't happen to everybody. That happened to a few people.

DR. NETON: That's a discrete incident.
DR. MAKHIJANI: It's a discrete incident. But the idea of exploring those kinds of things in this con-- context was to examine whether there were incidents and whether there was a potential for exposure. Say you're in a situation where you've said we don't know how to calculate dose, or you take the plutonium exposure example that -- that we have in the Nevada paper. There were these shots in Project 56. People got -- some people got significant plutonium intakes, and some of those doses were pretty high. Well, they're committed doses.
DR. NETON: Uh-huh, military or civilian?
DR. MAKHIJANI: I -- I'm not sure. I'd have to -- I'll have to check.
DR. MAURO: Yeah, Arjun, we -- we gave the -- the num-- we did not convert them to doses. I think right now we just have the exposure levels in terms of --
DR. MAKHIJANI: There are -- you haven't -- you haven't seen the -- maybe I don't have the latest report. You know, Joyce cal-- calculated the -- the exposures for the

plutonium --

DR. MAURO: Oh, okay, my version ha-- didn't go that far. Okay.

DR. MAKHIJANI: It doesn't have that, but -- but I have the calcu-- yeah, I put them all together day before yesterday, I think. And -- and so the idea was not to identify groups of individuals, and that's part of the reason at this stage we didn't separate military and civilian a lot. We know they were together and -- in many circumstances, but the idea was to identify is this not a radiological environment in which there were incidents, in which case the problem is solved. There's no less-than-250-day SEC. Or is this a radiological environment in which there were incidents and some doses that could be considered, by some criteria, high. And that's why (unintelligible) compiled as much as we could so you could take a look at the range of what's there.

DR. BEHLING: Can I make a comment here? I'm looking at your tables, the one on page 7, and I've also looked at it from -- in this book here, the NIC book, and if you look at

Operation HARDTACK, there were 37 tests during that period.

DR. MAKHIJANI: Table 1 in the Nevada paper?

DR. BEHLING: Yeah. And the -- the operation started September 12th and finished on October of '58, so you have less than a two-month period. And let's assume a person started there and was there for the full duration of 37 tests, and basically stayed for let's say four months, at which time basically the external exposure dose rate would have ceased to exist. And if he terminated at that point, you would have obviously considerably less than 250 days of work time.

At the same time, there were no additional tests thereafter until the next one, Operation NOUGAT, which didn't commence until 1961. So you have a long time interval between Operation HARDTACK II and the next event. And if you had a person who was there, two people, one stayed for a year plus and the other one terminated after four months, after Operation HARDTACK II, you can reasonably conclude that -- assuming they were standing next to each other throughout the whole time period -- that they

received essentially identical doses based on the rapid decay rate. And you would obviously say if this person had a dose that was compensable and qualified him for SEC based on the 250-day criteria, you would say fine, you're in, but the other guy is out. And it (unintelligible) reasonable to, at this point, exclude that other person who failed to meet the 250-day criteria based on just simple, intuitive logic that the two would have received the same dose.

DR. MAKHIJANI: It's actually a little worse than that because --

DR. NETON: (Unintelligible) say the same dose because there's resuspension issues that were there --

DR. BEHLING: Well, I know, but (unintelligible) --

DR. NETON: -- (unintelligible) --

DR. BEHLING: -- (unintelligible) talk about two external exposure and realizing that (unintelligible) equation which basically say --

DR. NETON: Well, external exposure is not the basis for the SEC at Nevada Test Site.

Internal exposure is the basis for qualifying for the SEC. We are reconstructing external exposures at Nevada. In fact I'll point out, of the 61 people from Nevada Test Site that have less than 250 days exposures and at least one presumptive cancer, we have dosimetry data for most of them. There are some gaps, but -- but by and large, these are people who visited the site once, twice, five, ten, 15 times, and we have that full -- we have external data for -- for many of those people.

DR. BEHLING: But even for internal, you (unintelligible) short-lived fission products that are obviously not in there (unintelligible) previous time, and --

DR. NETON: Right, but the long-term fission products and resuspension of plutonium and those type of things are still --

DR. MELIUS: Let's get away from Nevada Test Site --

DR. MAURO: Jim, you -- you brought up -- bring up a very, very important point in terms of defining the problem that we're trying to solve. What I'm hearing is that when we look at the 250 workday issue, are we saying that we

should only be looking at internal exposure?

DR. NETON: Internal exposure -- the inability to reconstruct internal exposure was the basis for granting SEC for this time period.

DR. MAURO: Well, I understand, and I think it's important that we discuss this because, see, what we did -- up until this point -- is emphasize external exposure --

DR. NETON: Right, and I was --

DR. MAURO: -- whether or not there were incidents whereby the doses could be considered somewhat uncontrolled over a relatively short period of time, and we -- we started at about one rem and up as being -- to -- to try to -- as a compendium of what transpired. But what I'm hearing is maybe we're looking in the wrong place, and I'm -- you know, I'm prepared to accept that since -- since the -- and this is unique to this site, because the basis for granting SEC was not based on external, it was based on not being able to reconstruct internal. So is it possible that we have just been looking in the wrong place and our attention should have been entirely on internal and short-term, and not on external?

DR. NETON: I would -- I think so. I mean I -- I guess one -- there is an argument one could make whether the 250-day should have included external, but we did not. We -- we felt that we had sufficient monitoring data to reconstruct external dose. And in fact, if you look at the records we have for the claimants that we're supposed to be applying this class to, the ex-- internal exp-- external exposures are fairly small, on a -- well, it's all relative, but the collective dose for all the cases combined, for all 61 cases, is 21 rem. That's combined for everybody. The highest recorded dose we have for anybody in this pool of 61 people is 4.7 rem. So -- external-wise. So -- you know, I was urging all along that we should be looking at the records of the claimants that we have and seeing how those apply to this class, as opposed to going out and looking at these military personnel who were standing at the blast. And yeah, there may have been some commingled civilian exposures, but we have data in our files for these people. And in fact, if you look through the records, they'll refer to the shots and

where a person was a civilian involved in a military shot, we have pretty good documentation of that and what they were doing. So --

DR. MAURO: Jim, I think that this is really getting to the -- a deeper perspective that we need to discuss. It's important, because in effect what I'm hearing is that this -- our concern here is with the -- the claimants as opposed to the scenarios that may have occurred.

DR. NETON: Right.

DR. MAURO: See, we came at this in a way that said -- asked the question what may have -- what -- what transpired at these -- during these tests 'cause -- to create a -- basically a compendium of information, and we did not -- and -- and ask ourselves the question -- and we zeroed in initially heavily on the external, but what I'm hearing is that we may have come at this thing incorrectly, and -- and I'm willing to accept that, but I think we need to talk about this. Namely, what I'm hearing is that we -- we -- the issue has nothing to do with external. The fact that -- let's say for

a second, just for a moment, that we're able to show that there were some incidents where some people -- we're not saying who they are, but they could have experienced an external dose, let's say in excess of 100 rem. Okay? Let's just say -- I -- I'm mak-- that didn't happen, by the way, but --

DR. NETON: Right.

(Whereupon, Mr. Larry Elliott joined the group.)

DR. MAURO: -- but let me just say it now. What I'm hearing, and you correct me if I'm wrong, is it doesn't matter. That is not the basis upon which we would make a judgment. You can -- you --your position is that that's not -- that question is not at play here.

DR. NETON: Right.

DR. MAURO: Because you would say that no, we -- we can reconstruct those people's doses and therefore the -- the whole -- so it's not really part of what we're concerned with here. You will reconstruct those doses and you will compensate because you can do a partial dose reconstruction and take care of that problem. The problem we're worried about, I'm hearing,

is those people who may have gotten a very high exposure that was internal and -- and should be included. So I have to say I'm struggling right now with defining the boundaries of our problem, and I'm not quite sure whether or not we -- you know, I -- I think we need to talk a little bit, maybe for my sake. How does everyone else see this?

DR. WADE: Well, let me -- let me speak --

DR. MAURO: 'Cause all of a sudden I have a different vision of this.

DR. MELIUS: Well, John, let me say that I think you're off-track here 'cause I think we -- - first we -- what we ought to focus on is how are we going to deal with the issue of these short-term ex-- discrete incidents. And then I think there's a separate issue of how it applies at -- at different sites. And I think what you and Hans have brought up -- you're sort of -- you're jumping ahead and -- and I don't particularly think that's something we should be discussing right now. I think --

DR. MAURO: Okay.

DR. MELIUS: It may be very relevant when we go to apply -- look at issues such as Nevada Test

Site and specific sites, but -- but I think we need to first go back and look at how are we going to approach this overall. I think that's the intent of -- of our discussion today and the initial steps for the -- for this workgroup.

DR. MAURO: Okay, good, I -- I think that needed to be said, though, so that we could get back to where -- I guess we -- where we were.

DR. WADE: Yeah, let me -- this is Lew Wade. Let me talk a little bit about sort of a number of issues, and I'll try and do it very briefly, starting with the last one that Dr. Melius discussed.

I mean the working group can define what it wishes to look at. The working group really was born of the issue to look at SE-- SEC-related issue, and the working group, through its chair or the Board can advise the working group, can decide upon what issue it wants to look at, what issues it wants to look at. That's perfectly reasonable and that intellectual direction can -- can go anywhere that they choose to take it.

As it relates to the issue of making a

recommendation for the Nevada Test Site or Pacific Proving Ground on the issue of less than 250 days, I would also point out that the working group will bring a recommendation to the Board, the Board can make a recommendation to the Secretary, the Secretary will eventually have to decide this issue. I would encourage the working group to make its records as complete as possible to advise the Secretary, and I know that the working group will do that. I will also say on the record that if the Secretary wishes in any way to inform the working group as to the Secretary's thoughts or needs, then that needs to happen as well. But again, the -- the discussion can go where the working group wishes to take it. The issues need to be explored as the working group wishes to explore them, and I think that's all that needs to be said.

MS. ROBERTSON-DEMERS: This is Kathy Demers. I have a question for Jim. You said that in your pool of 61 individuals, the highest dose was 4.7 rem?

DR. NETON: External, yes.

MS. ROBERTSON-DEMERS: Okay. In -- in your

pool of 61 individuals, did you include individuals from the laboratories which came up to the site and participated in the tests?

DR. NETON: This is the pool of actual claimants that we have.

MS. ROBERTSON-DEMERS: Okay.

DR. NETON: Not a sampling of -- across the site. I just took the people who would have to be adjudicated based on this SEC class --

MS. ROBERTSON-DEMERS: Okay.

DR. NETON: -- the people who were not elig-- currently eligible for the class based on the 250-day requirement and -- but they do have a presumptive cancer.

MS. ROBERTSON-DEMERS: Okay. Just to let you know, we have run across an external dose of 18.5 rem, and this was actually a Los Alamos employee who participated in a shot at NTS. He later went to work for NTS, but at the time he received this exposure he was a LANL employee. So when we talk about those individuals who are exposed to high doses at the test site, we need to bring in those laboratory people.

DR. NETON: Yeah, that's fine, Kathy. I wasn't trying to, you know, cover the universe of

potential exposure. In fact, he may be in one of these 444 cases that already meet the definition of exposures since he was there possibly more than 250 days. But -- but nonetheless, my original statement was that we believe we can reconstruct these external exposures. And a lot of the data I'm hearing around the table tends to support that, that we do know what these levels were.

DR. WADE: But again, the lead will come from the working group as to the direction that we take.

DR. MAKHIJANI: May I go -- may I go through the other --

DR. MELIUS: Yeah --

DR. MAKHIJANI: -- things that went into the --

DR. MELIUS: -- please.

DR. ZIEMER: I have one additional --

DR. MELIUS: Oh, yeah.

DR. ZIEMER: -- question or comment. I think it's very helpful to get some idea of what numbers come out of these incidents, and I found it very helpful. One thing that occurs to me as I look through the data, I think on all of these what they tend to do is they

select out the top end -- the few people who got the highest exposures. For example, if you look at the Y-12 data, those -- those five people are the ones who were right there --

DR. MELIUS: Right.

DR. ZIEMER: -- when -- when the impromptu barrel reactor had its excursion. But there are hundreds of people who got exposed from this. But they were all -- I was in the next building and I got exposed to that. But it is sort of insignificant when you get out very -- you don't have to be very far away from any of these when your exposure gets down to normal -- almost normal working exposures in a facility. So all of these are -- in their reports I think get truncated simply by who are the high people. And maybe inherently they pick people who are above some sort of management level in that facility, whether it's one or two or a few rem and up. They don't report the rest of the folks in all of these that got maybe some elevated exposure. Do you think that's -- would you agree that that's probably the case, that most of these are the folks who were right close in, and in almost every case where

there's a -- an incident like this, criticality, it's a known incident, is it not? Are we -- are we postulating that some of these could have occurred without people knowing it, or do you know whether it --

DR. MAKHIJANI: Well, they -- they would have at least had to know it post facto to have documented it, but -- the unknown unknown, as Mr. (unintelligible) would say.

DR. ZIEMER: Is that a quote?

DR. MAKHIJANI: But -- but I think, as I -- as I read the criticality data, I think you're right in the sense I don't think they're excluding some tail of the distribution. I think they're taking to account only the people who are nearby or involved with the accident or in the control room or in the room where the vessel exis-- you know, where the reaction occurred.

DR. ZIEMER: Right.

DR. MAKHIJANI: At least that's my impression, from reading over the data.

DR. ZIEMER: Right.

DR. MAKHIJANI: I don't think they're taking next-building people.

DR. ZIEMER: Right, that's exactly right. And so automatically sort of an administrative truncation where you're picking the high end here, but even that has a big distribution. And I'm not sure -- if one were arguing that something like this could have occurred without our knowledge -- you know, breakdown of radiologic controls -- could -- could -- is that an argument that anyone is making?

DR. NETON: There have been claimants who made -- made those arguments, that criticalities occurred that were undetected by the -- by the facility. That's been an argument in a couple of cases.

DR. MAKHIJANI: It's not something that I --

UNIDENTIFIED: Small level.

DR. NETON: Small level.

DR. MAKHIJANI: -- factored into our report.

DR. ZIEMER: No, I understand, but I -- what I'm -- what I'm getting at is that basically what this does is give us some handle on what kind of doses could occur if that in fact were the case and individuals -- and I would -- I would tend to look at the upper end of these, the people in close. Those are the numbers of

concern.
But the other part of that is, in many of these those doses are high enough that you would expect to see the non-stochastic effects --
DR. MAKHIJANI: Right.
DR. ZIEMER: -- which is a different endpoint. You have, for example -- well, certainly in the Japanese case, the guy was --
DR. NETON: Well, two of the workers (unintelligible) --
DR. ZIEMER: Right. So -- and I think even -- even in the Oak Ridge case, they -- they saw -- they weren't lethal doses, but they saw blood effects early on, so --
DR. NETON: In fact in our -- in the petition, if you're -- if you're petitioning as a discrete incident, one of the proofs that you could submit is, in our regulation, medical evidence that one or more members of the class may have incurred a high-level radiation dose from the incident such as depressed white blood counts associated with radiation exposure or the application of chelation therapy in terms of an internal high incident. So we -- you know, we envisioned that. You know, if you're

proposing a class based on an incident, then you'd like to see, you know, medical evidence of some type --

DR. ZIEMER: And that --

DR. NETON: -- and that, I think, kind of speaks --

DR. ZIEMER: -- and that's clearly high, no argument.

DR. NETON: And I think that statement actually speaks to the level that we intended these to be in the range for (unintelligible) --

DR. ZIEMER: The problem --

DR. NETON: -- blood cells --

DR. ZIEMER: -- I'm having with getting away from stochastic -- or non-stochastic effects such as blood count and so on, where are we on this? At what point is it still high or at what point is it the folks in the next building and that's just routine stuff? That's --

DR. NETON: Right.

DR. ZIEMER: -- sort of the issue that I'm struggling with.

DR. MAKHIJANI: Well, that's partly what I was trying to put before you to (unintelligible) out.

DR. ZIEMER: Yeah, so we can think about --
DR. MAKHIJANI: White blood cell counts might not be a bad (unintelligible) rem.
DR. MAURO: Yeah, coincidentally, ten rem is sort of the number that gives you not only the threshold where you see the acute effects, but also -- about -- but also the threshold where you start to see stochastic effects.
DR. NETON: Well, we have to be careful when we start talking about stochastic effects now because the techniques are so sensitive, one -- some people -- I've been to conferences where they'll say (unintelligible) down to one rem now.
DR. MAURO: Yeah, they're all -- I agree with you, there are places where they bring it down to one.
DR. NETON: But traditionally I think, you know -- at least when I was growing up in health physics, 25 to 50 rem was sort of the ball park of where you could pretty easily see circulating, you know, effects in white blood cell depression. I mean just talking about decline in the count itself, and without special -- special techniques. But that was

sort of the intent and that got to the qualitative issue as -- you're saying -- to a health physicist looking at data, you start seeing blood cell depression, you start seeing administration of chelation therapy, those are the kind of evidence points that we would be looking for to say well, this was a discrete incident that was high enough where you don't need to start applying these PC calculations where you're refining your estimates down to, you know, the class. So that -- that was clearly the intent of the way this was put together.

DR. MELIUS: But -- but I would question whether that really matches up with sort of the equity argument with the 250 day -- what we talked about earlier.

DR. NETON: Well, the 250 --

DR. MELIUS: I mean I think (unintelligible) have to be careful about, you know, what kind of test you put on -- on the -- the criteria for health endangerment for, you know, a discrete incident not to be something that, you know --

DR. NETON: Agreed.

DR. MELIUS: -- yeah, a great deal different than that.

DR. MAKHIJANI: Could I put two other points on the table for discussion, because I think it would help.

DR. MELIUS: If they're -- if they're from your first paper.

DR. MAKHIJANI: Yeah, okay. Only from -- I'm with you -- I'm with you, Jim.

The -- the two other things that seem important for this discussion that are in the paper were the legislative record -- I could find only one -- one piece in the legislative record that actually talked about Amchitka and doses. I -- so I put the whole thing in so people could see.

DR. ROESSLER: What page are you on in what document?

DR. MAKHIJANI: On -- on the health endangerment paper --

DR. ZIEMER: Page 19.

DR. MAKHIJANI: Yes, with a statement by Senator Frank Murkowski, and he actually quoted dose reconstruction done by Dr. Bertell that -- I talked with Dr. Bertell subsequent to seeing

this, just a few days ago and I made a few notes from that conversation and sent them to her. I actually think the 669 to 7,240 (sic) millirems for a year -- I don't think they're for a year, I think that's cumulative doses -- they are internal and external combined. And the way she did the calculation, if I understand it, is she took job categories and assumed that somebody just did one category of job and that was the low end, and somebody else may have done all of the categories of job serially and participated in everything, including the cleanup, and that would be high end. I have not seen the paper itself. I have requested Dr. Bertell to send it to me.

But I thought this particular thing was important, not for its technical content but for what -- what Congress saw when they -- technically, when they passed the legislation containing Amchitka without the 250-day restriction. And I made a list of six factors that I -- you could actually relate to the rule.

The statement indicates that those are the difficult to quantify. The dose records are

partial since they are dose -- I'm just saying what's in the statement, not my opinion; I haven't (unintelligible) -- dose records are lost or improperly maintained. They gave a range of doses under one rem to just over 17 rem. And potential for episodic exposure. And then it talks about quarterly and annual dose limits, and that the workers were not properly informed.

And there's some broad general sense in which you could relate this to 42 CFR 83, and I tried to do that. And you can argue the merits of it or -- or demerits of -- of how I tried to do it, but I just wanted to sort of call attention to there is a range of doses in the legislative record from Amchitka which doesn't have -- and the other -- the other thing that I -- I -- the other two things, actually, are the reduction of 250 days to 83 just because people were present is an announced policy of the Department of Labor in how it's going to treat Pacific Proving Grounds and Nevada Test Site, as I understand it.

DR. NETON: Portions of the Nevada Test Site.

DR. MAKHIJANI: Portions of the Nevada Test

Site, thank you. And I think that that applies in the absence of the Advisory Board or the Secretary of Health and Human Services having made a decision of health endangerment. But if presence at the site -- you know, sleeping in a trailer -- is -- is considered sufficient to reduce the time from 250 days to 83 days, then it does raise the question of -- what does it imply for -- and the last factor -- the last factor -- let me just put all -- all the issues on the table, then I'll -- then I'll stop. The last thing that -- that -- and actually based on Hans's calculations that were presented to the Board in June, I believe, at the D.C. Board meeting, and they related to internal dose from thorium at Ames from a single day's intake with committed -- 50-year committed doses. They turned out to be quite high for certain organs and they are there in Table 5 of the paper. And the -- the issue here is that if -- for instance, at Nevada Test Site -- somebody worked for 251 days and had a plutonium intake which you can't properly characterize and you're giving them an SEC, they would also be getting -- getting the dose

over a long period of time, and so the question of whether internal doses should be considered within this framework -- today I'm hearing that they should be considered. But in the past, informally, I've heard expressed that maybe, because it's committed doses over a long period of time, they shouldn't be considered there. The argument I think that I've made, at least for people to shoot at, is that it seems that internal doses should be considered if there was a failure of radiological controls and incidents of exposures in a relatively short period of time. So those -- those are sort of the other complicating issues.

MS. HOMOKI-TITUS: Liz Homoki-Titus. I just want to be clear and make sure that everyone understands, under the regulation you have to either pick the 250-day requirement or presence (unintelligible) if they want to decide how to count the work days. So I just want to be sure that we're not going in a direction where the Board might recommend 83 work days or something like that, unless you want to make the recommendation to the Secretary to change the rule.

DR. ZIEMER: No, I think --
DR. MELIUS: We understand that.
DR. ZIEMER: -- we understand that. That -- that's how Labor -- we understand Labor is interpreting it --
MS. HOMOKI-TITUS: Right.
DR. ZIEMER: -- is they're doing a weighting, and I think we have sort of indicated that we think that's reasonable. It weights the amount of time there.
MS. HOMOKI-TITUS: Okay, I just wanted to make sure that we're all on the same page. Thank you.
DR. NETON: A couple of issues Arjun raised, one is -- the regulation never intended to discount internal exposures for less than 250 days. In fact, that statement I just read about chela-- administration of chelation therapy would support that, that --
DR. MAKHIJANI: Right.
DR. NETON: -- you were involved in a -- for instance, a glove -- a ion exchange column explosion at Hanford and were administered chelation therapy for your intakes and we couldn't reconstruction your dose, we'd

certainly consider something less than 250 days in that case.

Secondly, the reduction of exposure time from 250 to 83 by Labor I think is very consistent with the reason the class was granted, which was based on our inability to reconstruct internal exposures, not external. So if for instance these people were living there, swimming in lagoons, eating local vegetation, that sort of thing, it makes sense to me that presence of less than 250 days because of the 24/7 exposures, it makes sense to reduce it.

DR. MAKHIJANI: No, I agree with that. I'm not arguing that it doesn't make sense. I am just putting the question before the group that if you're doing that, then what does it -- and I don't have a clear, clean answer to this question -- is what does it imply if you consider that in the context of health endangerment? I don't have an answer to this question. I think it does raise the question.

DR. WADE: Just to be open -- Jeff Kotsch, are you still on the line? Jeff Kotsch?

MR. KOTSCH: Yeah, still here.

DR. WADE: Is there anything you would like to

say, Jeff, at this point -- since we're talking about DOL and decisions they've taken or -- I'll give you an opportunity to speak if you'd like.

MR. KOTSCH: Unfortunately I've only been listening with half an ear, but basically, you know, we're -- our interpretation of -- at like Nevada Test Site or even PPG, if we determine that a person is there continuously, that's the reason we use that -- you know, the 83-day or whatever the value is --

DR. WADE: Thank you.

MR. KOTSCH: -- as an interpretation of the 250-day standard.

DR. WADE: Thank you.

DR. MELIUS: Yeah, Paul.

DR. ZIEMER: Yeah, I had just a comment on the congressional intent issue here. I think it's very helpful to know that and I appreciate Arjun putting that information in. It's interesting to me that point five says that exceedance of the quarterly limit and that five rem is considered significant. I don't know, Arjun, if you're saying if -- if you are -- I -- I don't know that the fact that that argument

was used, I don't know if that necessarily means that Congress says that particular argument was significant. You're -- you're pointing out that was part of the argument.

DR. MAKHIJANI: Right, that's all I'm saying.

DR. ZIEMER: Yeah.

DR. MELIUS: It was -- it was Senator Murkowski.

DR. ZIEMER: It was one of the points Murkowski made.

DR. MAKHIJANI: Right.

DR. ZIEMER: To me, the important one is the third point, that -- where he's saying that at least they're estimating that the doses to the people might be as high as 17,000, and they're also saying we don't know what they are, but certainly the upper --

DR. ROESSLER: 17,000 millirem.

DR. ZIEMER: -- millirem, a 17-rem per year, certainly the upper end of this seems to me to be the most significant thing.

Now obviously if you're making the argument to Congress, you would want to point out that people are exceeding the legal limit. Whether or not Congress thought that was significant I

think is speculative. That's the only point I -- I would make here.

DR. MAKHIJANI: I agree.

DR. ZIEMER: You know what I'm saying?

DR. MAKHIJANI: No, no, I completely --

DR. ZIEMER: And I would make the same argument if I was standing before Congress. I'd say and these guys are exceeding the legal limit.

DR. MAKHIJANI: Right.

DR. ZIEMER: But is that what swayed the day, or is it the fact that there are doses as high as some number, number one, and number two, there are these uncertainties and we don't know what they're getting. So -- and it's probably a preponderance of all of those things taken together.

DR. MAKHIJANI: Right.

DR. ZIEMER: I just -- I was uncomfortable with the idea of putting too much weight in the fifth point, and that's what I was talking about earlier. A quarterly limit is -- it's a -- it's a management limit, in my mind. And not everybody agrees with that, but if a person -- if all they ever got in their life was three rem, except for some unusual situation where

you had the combination of age and -- and other factors and the right cancer, maybe it would come out and, you know, we'd go with our POC stuff. But otherwise, I -- I'm more concerned about these incidents that can indeed cause what I would sort of intuitively feel is higher.

DR. MAKHIJANI: Right.

DR. ZIEMER: On the upper end of that, you know. I'm not comfortable with people getting 17 rem per year.

DR. MAURO: Dr. Ziemer, I completely agree. I also would like to add that probably one of the considerations is establish precedent. That is, when we move forward -- you folks move forward, taking into consideration the precedent established by the decision-making that supports Amchitka should be part of the argument when we -- when we come out of the back end of this process. Collectively the -- the arguments made that obviously were convincing to Congress needs to be part of the milieu of our thinking. So I think it's important, Arjun, that you did put that out.

DR. ZIEMER: Well, and see, I think it's a good

argument from a different perspective. I don't look at that number as a -- as a health issue. To me, it indicates lack of rad controls and therefore you don't have a good -- you're -- the site's not being management -- managed well. That's -- that's the kind of argument that would -- to me is more important in the long run. They're not managing their workers well and therefore there's reason to think there could be problems. That's -- that's just a point I would make here.

DR. MAKHIJANI: I -- I agree with you. I mean I would -- I just tried to look at that statement and say what are the points that were made.

DR. ZIEMER: And those were the points they made, yeah.

DR. MAKHIJANI: In my personal opinion, I think the failure of radiological controls is -- is clearly -- well, it's there in the regulation --

DR. ZIEMER: Yeah.

DR. MAKHIJANI: -- it's clearly and important thing and how -- how you define failure of radiological controls obviously, to some extent

--

DR. ZIEMER: Well, there's the starting point right there.

DR. MAKHIJANI: -- might be a legal -- legal idea to what controls were expected.

DR. MELIUS: So can we come up with a way that would -- an approach that would allow us to -- what are discrete, high exposure incidents?

DR. ZIEMER: Well, I have another question --

DR. MELIUS: Okay, go ahead.

DR. ZIEMER: -- that could -- maybe Jim can help me with this, too. On Table 5 -- and Arjun, I'm just trying to make sure I understand Table 5.

DR. MAKHIJANI: The Ames table?

DR. ZIEMER: Yeah, it's page 24 of the -- of the "Parsing" paper.

DR. MAKHIJANI: Yeah.

DR. NETON: What page is that on?

DR. WADE: 24.

DR. ZIEMER: Page 24, Table 5, 50-year committed dose.

Your final column, it's 50-year committed dose, rems per day of intake -- is this -- let me see if I understand this right. Are you saying,

for example, if the person were there under the -- under the prescribed scenario for one day, inhaled I guess maybe eight hours of continuous inhalation, then their committed dose for lung would be ten rem for one day of intake --

DR. MAKHIJANI: Let's call the man who did the calculation.

DR. ZIEMER: -- and five for red marrow and 145 for bone surface?

DR. BEHLING: Yes, and the assumptions are actually nine hours. I think they were specified in the --

DR. ZIEMER: Oh, okay.

DR. BEHLING: -- the report, and there was some discussion that Jim and I had that the methodology by which this was calculated was perhaps a factor of up to three too high, based on the crude method by which alpha detection (unintelligible).

DR. NETON: These are gross alpha measurements.

DR. BEHLING: However, that is more than compensated by the fact that this only includes thorium and it does not include radium-228, actinium-228, thorium-228, and radon-220. So when you add that back into the calculation,

those numbers will go up -- way up.
DR. NETON: I'll have to look at it, but --
DR. BEHLING: Yeah, they will.
DR. NETON: -- I do -- I do remember John Pos-- Dr. Poston asked the question. This was actually 50-year committed dose --
DR. BEHLING: Dose per day of --
DR. NETON: -- per -- per one day of intake, yeah.
DR. ZIEMER: So if a person was there for a week -- for -- for five days, for example, they'd get a 50 -- a 50-rem lung dose.
DR. MAKHIJANI: And this was a daily weighted average intake, so -- the way they used to do those surveys. You know, so many minutes in the lunch room, so many minutes in this kind of job and so (unintelligible).
DR. ZIEMER: When I saw these numbers, Jim, I was wondering if one could, for example, take lung cancer and some typical scenario and say how many days of such exposure would it take to get --
DR. NETON: Oh, you could. Yes, you could. But see, that gets to the issue of these cancer-specific SECs (unintelligible) --

DR. ZIEMER: I know, I know, I know.
DR. NETON: -- didn't want to have. The Board actually recommended they didn't want --
MR. ELLIOTT: Well, through public comment in the regulatory process we arrived at that.
DR. NETON: But I would -- I would suggest -- we may be getting ahead of ourselves again here, but these are doses per organ and then, as I mentioned before, then we would have to have this three-by-three matrix (unintelligible) --
DR. ZIEMER: I -- I know.
DR. NETON: -- for is it leukemia that drives this as the lowest possible -- and then to come down to the lowest possible exposure time that would get you to 50 percent, we'd have to come up with some --
DR. ZIEMER: Well, see, that's what I was thinking about when I saw these numbers, but -- but it's a multi-factorial array --
DR. NETON: I think it would be pretty easy to convince someone that ten days' exposures to thorium, if these numbers are correct, would more than likely get everybody over 50 percent for lung cancer. But that doesn't do anything

for the person who has leukemia or who has some other cancer that should be in here -- you know, should be lower based on some other combination of cancers, latencies and -- and risk factors. And that -- that-- I don't know how we would approach that. (Unintelligible) practical issue is how we ended up how we did, I think. We couldn't solve this problem (unintelligible).

DR. ZIEMER: But do you -- do you have to be able to show that there -- that's -- that an incident occurred, then, that could have led to high intakes like this, just --

DR. MAKHIJANI: This would be a failure of radiological control, I would say, because you have -- you have dust that is very consistently and very largely over the established control limits. But this --

DR. ZIEMER: Well, I don't know what the scenario was here, but I --

DR. BEHLING: The issue -- no, but I just want to get back to what Jim was saying, the complexity, because when we talk about external dose it's an easy one to deal with because one external dose pretty much defines exposures to

all tissues that might become cancerous and therefore compensable. But when we talk about internal dose, the selection of the same dose becomes very critical based on the potential that the tissue of question is very limited when -- let's talk about iodine as an example. The dose is -- be pretty much driven -- or the issue will be driven by thyroid exposures and -- and we know that dose to the thyroid has to be very high in order to reach a 50 percent compensability level. And so there is no such thing as a single dose that you could point to and say this will be sufficient, because it's driven by the radionuclide when we talk about internal and the specific cancer that that radionuclide would potentially put that person at risk.

DR. NETON: I'm more worried about bounding the low end, though. The high end, I think we can say -- we could get one cancer and let's say (unintelligible) you have a lung cancer that they'd be compensated. But then to bound the low end to give you the lowest possible exposure so that -- for the cancer that -- that -- you know, the absolutely one cancer you

can't reconstruct, and if you get down real low -- for leukemia, polycythemia (unintelligible), one of those type things -- I don't know that we can actually calculate that. You're going to have to take a hypotheti-- I hate to use the word hypothetical in front of Dr. Melius, but a hypothetical claimant who -- who was maybe 18 years of age at exposure and developed leukemia at age 22 and was -- was exposed to very soluble mater-- you know, you get to all these machinations where you're always going to be -- can be challenged on that low end, what is the lowest level of discrete exposure that would bring that class in. So --

DR. MAURO: Jim, let's try to simplify. Let me ask a simpler question. Let's say for the moment we all agree that at Ames there certainly were -- situations existed whereby, over relatively short periods of time, people -- some people could have experienced exposures which could easily have been responsible for particular cancers. And let's say we all agree that that's true -- and I think we do, given the numbers that Hans reported there.

Now the ladder then becomes -- okay, let's say

we all agree on that. What form does the finding come out? In other words, let's say we're about to say something about Ames and about the 250-day. Is it -- is it something that we say well, yes, there certainly is a -- a potential for endangerment for people who worked there for less than 250 days. But now we also know something more. We know -- however, the endangerment is only limited to let's say certain people that were in certain places at certain times, and also endangered -- the reality is, if it was this cancer and this cancer and this cancer, absolutely. But in the case of these other cancers, not a chance. But I know that there's a problem with parsing to that level. I know from -- I guess from other -- from other discussions we've had, it seems that we all could agree very readily regarding let's say bone cancer and lung cancer. But in regard to some other cancers, we could probably even make a case that it's virtually impossible that these levels of exposures could have -- could have been a -- been a problem. So is that why you're going to the low end, so that you could say something about all cancers?

DR. NETON: You have to -- you have to be fair to the class. You have to -- you have to pick the lowest dose for the cancer that can't be reconstructed. I mean that's --

DR. MAURO: Yeah.

DR. NETON: -- the way it works, so you have to -- you have to drive it to the lowest level. Otherwise you're not being equitable to the entire class.

DR. MAURO: And as you pointed out, to do that is an in-- dimensional problem that --

DR. NETON: It's a -- it's a three-dimensional matrix. It's huge.

DR. MAKHIJANI: Maybe in some way this is backwards in that a problem in practice may be simpler than this very complicated case. So if we -- if we take this particular example of Ames, and the way the rule is written, that you have to be able to reconstruct for all this -- for now, let's just say the SEC cancers -- and that we cannot do it for any cancer, then you're in. If you apply that to the idea, not of the doses people got but for the potential for exposure and you have this one big exposure -- one-day intakes leading to committed doses

that are this high -- then you know there are some cancers in the -- in the SEC list of cancers that -- that could have been caused by this level of exposure. And so I think then you have to include everybody who was not in the -- if you have conditions like that, then people exposed (unintelligible) --

DR. NETON: But Arjun, the point is that the dose -- for internal exposures, the dose is directly related to the exposure duration, the length of a discrete incident --

DR. MAKHIJANI: Right.

DR. NETON: -- you're going to define. So if you define the discrete incident as one day and I can -- there's potentially some less exposure that could occur -- I'm not sure I can find it, but there could be a smaller length of time exposure that could have been -- caused some other cancer that should be the driver to make that an SEC. You don't say -- you can't -- you can't brack-- you can't come -- bound with a lower bound on that discrete exposure.

DR. MAKHIJANI: For practical purposes, if you're talking of somebody who was there for a few days -- I mean what's the -- in a way,

what's the universe of people that we're talking about? We're not talking about somebody who popped in for a few minutes and then went away.

DR. NETON: Oh, I don't --

DR. MAKHIJANI: We're talking about people who are employees.

DR. NETON: When you have a thousand people in a class or whatever, you have that walk through an area for ten minutes that have -- be -- have to be adjudicated somehow. It's going to happen, and so you have to really define the lower bound very scientifically. Otherwise I don't think the case can be adjudicated properly. We're going to be challenged -- we see this all the time. I walked through the area to deliver the paychecks. I was there maybe 15, 20 minutes. So how do you --

DR. MELIUS: But -- but I disagree with that, Jim, 'cause I think -- remember, these are -- by definition, you can't do the dose reconstruction. You don't have sufficient accuracy and so forth, so that mean-- I mean it's not dissimilar to the kind of decisions that are being made -- probably by Department

of Labor, in effect -- for determining who qualifies for the SEC at the 250-day level.

DR. NETON: But that -- that is the level, they have to demonstrate 250 days exposure. I mean that's (unintelligible) --

DR. MELIUS: Yeah, but -- but -- but --

DR. NETON: -- in the regulation.

DR. MELIUS: -- the job class-- there's job classification issues and --

DR. NETON: Sure.

DR. MELIUS: -- so forth and -- that probably -- I mean I'm not -- I think if we try to find -- search for too much precision here, we're fooling ourselves in terms of the nature of the information and it -- it --

DR. NETON: Well --

DR. MELIUS: -- I mean I understand your theoretical point, but -- but you know, mak-- making a cutoff, whether it's a week or a month or -- or a day is something that just ha-- you know, nature of the way it has to be done.

DR. NETON: Oh, I know. I agree. I think it has to be solved technically because 250 days is cast in concrete. That's not debatable. That's part of the rule so Labor can -- Labor

can use that. When we define the length of duration that would allow you to be a member of the class, then it has to be based on some sort of scientific analysis that would, you know --

MR. KATZ: Can I --

DR. NETON: -- well, if you want to change the rule. Right now it's a qualitative thing. It's really either very high, like a criticality, or it's 250.

DR. MELIUS: Yeah, but we're --

DR. NETON: Now we're trying to go to the other extreme to -- well, let's define the time. What is the duration?

DR. MELIUS: Yeah.

MR. KATZ: I'm sorry, this is Ted Katz from -- from Atlanta. I just -- it -- it's sounding a little confusing to me where you're going with this, Jim, because if it's not 250 days, you're not defining a period of time whatsoever except for the period of time over which the incident occurred.

DR. NETON: Exactly.

MR. KATZ: That's it.

DR. NETON: That's what I'm saying, though, with the de-- if the incident occurred -- if it

was a chronic exposure situation like we're talking about at Ames -- I mean this was a airborne cloud over a period of days -- the question is, what is the lowest period of time of that incident that would get someone in the class.

MR. KATZ: No, I think the question is what is the period of time over which that cloud existed.

DR. NETON: Well, it could be anywhere from five minutes to five days, say.

MR. KATZ: Well, if it was five days, then -- then the class would be defined as anyone who was present for any amount of time within those five days during which the cloud existed.

DR. NETON: Any period of time.

MR. KATZ: Any period, 'cause -- because the standard is presence, not -- not a duration. So anyone who walked through or who was there the entire period during which the incident occurred would be part of that class.

DR. ZIEMER: But you have to know when that incident occurred.

MR. KATZ: Exactly.

DR. ZIEMER: Now, what about a site at which

unknown incident have occurred and we don't know when or where? I think is -- is part of what we're trying to grapple with here, aren't we?

DR. MELIUS: I think we're more like the other end. We're going to have known incidents and not know where people were or -- or -- in rela- - I mean so I think it's going to be the location issue that's going to be the -- the -- the thing and the...

DR. ZIEMER: Seems to me that's a little easier. I mean if --

DR. MELIUS: Yeah. No, I mean I agree. I think that can be dealt with.

DR. ZIEMER: -- (unintelligible) prove that they were somewhere else, then you assume maybe they were in it.

DR. MELIUS: Yeah, and you may have to define it within -- yeah.

DR. ZIEMER: Is that really going to be the driver, known incidents but we don't know where the people are?

DR. NETON: Well --

DR. MAKHIJANI: Well, that's why you can't calculate the dose. Right? If you say you

can't calculate the dose --

DR. NETON: Yeah.

DR. MAKHIJANI: -- then -- that's how I understood --

DR. ZIEMER: Well, I thought we were talking about the possibility of unknown incidents occurring.

DR. NETON: No, at least --

DR. MAKHIJANI: I'm not.

DR. NETON: We'd have to establish an incident.

DR. MAURO: I think -- this is John Mauro. I think something important just happened now, though. Namely, with the help of Ted, what we're saying is we've almost solved the Ames question. I hate to leap like this, but what I'm hearing is we all agree that there were conditions at Ames where the airborne dust loadings over some period of time were clearly and unambiguously at levels that endangered the health of the workers, and that this period of time was relatively short. So in effect --

DR. NETON: I don't know if we've agreed to that yet, John.

DR. MAURO: Okay, that's --

DR. ZIEMER: (Unintelligible) suppose that were

the case.

DR. NETON: (Unintelligible)

DR. MAURO: -- why I didn't want to leave that 'cause I thought we were close to something here and I (unintelligible) walk away from it.

DR. MELIUS: Don't leap yet, John.

DR. MAURO: Okay.

DR. WADE: (Unintelligible) discussion continue.

DR. MELIUS: Either that or go to the first story.

DR. MAURO: No, I actually wasn't leaping, that's why I was doing this. I felt as if we were making -- we -- something important happened on Ames in terms of trying to come to grips with -- see, Ames turns out to be a lot simpler problem and -- and to allow us to explore the philosophy and strategy that we're -- we're engaged in here and -- and we were making -- and some important things were said and I was hoping that we could keep it going that way to see if we could start to achieve some consensus. Ted said something very important. It was the fir-- that is, the time -- once you've established that such conditions

exist over some time period -- let's say it's five days and that -- that -- the fact that a person was there for a very short period of time is really not one of the criteria. If he was there and the conditions existed, then what we have is a person that would fall into that class. Now that's what I was hearing.

DR. NETON: I don't necessarily agree with that, and maybe --

DR. MAURO: Okay.

DR. NETON: -- maybe we need to talk, you know, among our NIOSH folks here on the side eventually, but mere presence alone, just walking through this incident, would not give you a dose that was exceptionally high, similar to a criticality. That -- I guess that's where I was going with that. You -- there's got to be some minimal duration of exposure that would be considered to be exceptionally high. But -- that's what I'm trying to say, you --

DR. MAURO: That's why I'd like to stay with this a little longer because it's -- we're -- we're -- we've got a very well-bounded issue that has very real implications, at least for Ames --

DR. NETON: Yeah.

DR. MAKHIJANI: -- and -- and if we -- if we could -- see, if we can't deal with this one, if -- you know, essentially this is a -- this is about a simple issue that we can -- can engage in in terms of trying to come to grips. It's much simpler than let's say some of the issues that we're going to encounter on Nevada Test Site, so that's why I guess I -- I'm feeling enthusiastic about continuing with the Ames discussion, with some hope of getting some -- at least tentative consensus on, you know, what -- what is the right way to come at this problem.

DR. ROESSLER: It seems to me, though, we're right back at the beginning, because now we're going to have to define an incident.

MR. GRIFFON: Yeah, I agree.

DR. ROESSLER: Wasn't that -- wasn't that our original problem?

DR. MELIUS: And I think that's the crux of it --

DR. ROESSLER: Yes.

MR. GRIFFON: I agree.

DR. MELIUS: -- that there -- what -- what kind

of an incident fits the definition we have in the --

DR. BEHLING: I think that Ames really -- John -- for John's sake, Ames really has two components to it. There's the particular bombs that went off, which are discrete and very -- and have a very finite duration for exposure. And if you look at the report again, there was cartoons about the five secretaries that were ushered back in and encouraged to resume their job as secretaries -- who were potentially exposed during those explosions. That's one event.

The other is where -- where we talk about air concentrations. Those were assumedly steady-state conditions because there were air -- random air samples taken at various job locations and they have no finite period. When we talked about it, we did effective dose for one day of exposure. That essentially can be assumed to have continued for long, long periods of time so if a person reported for that job day after day after day, that exposure would have been continuous.

DR. NETON: That's why it's an SEC class.

DR. BEHLING: It's a sample. It was done -- the AEC came down and said here we are, we're going to do some spot samplings, and they weighted it. It wasn't even for eight hours, it was for the duration that a worker worked that location.

DR. NETON: But then --

DR. BEHLING: And so these are reasonable assumptions.

DR. NETON: -- to make the leap that this went on for months. We don't know that. That's the point, we don't know the upper bound (unintelligible) --

DR. BEHLING: Well, (unintelligible) can certainly conclude that based on the production quantity and assuming that the potential work that was done at a given location was basically one that was in a steady state mode.

DR. MAKHIJANI: I -- I think one -- one maybe -- one point might be discussed is the -- the idea -- the concept is excessive, which is that -- essentially argument between Hans and Jim is how many days (unintelligible), and the concept I'm holding forward is the potential for exposure, not actually getting into what the

exposure was 'cause you already decided you can't calculate the exposure. I agree with Jim there. So you don't know what the radiological conditions were from a three-day survey in March, 1952. But you know from the descriptions of the events that those kinds of conditions existed, even though we can't put a number on it. You can't calculate individual dose, but you can infer whether the conditions were similarly dangerous, and so -- or risky or the potential existed for similar doses so you can actually arrive at an endangerment decision based on presence during incidents or presence during those workdays. And I think this is an important distinction because we keep going back and forth between can we arrive at a dose number. And the way I thought about this in parsing the rule is really the focus should be on potential for exposure for those who worked for less than 250 days.

DR. ROESSLER: Is there a -- Jim talks about there is external dose or there are external measurements.

DR. NETON: For which site?

DR. ROESSLER: Well, I don't know. Is this --

is this --

DR. NETON: Oh, at NTS we have considerable (unintelligible).

DR. ROESSLER: -- is this true acro-- if this is true across the board, is that a measure then? And it wouldn't be very exact, but is that some sort of measure of what the total dose would be?

UNIDENTIFIED: Not combined with the internal.

DR. ROESSLER: Yeah.

UNIDENTIFIED: That's the problem.

DR. NETON: I think we've identified an issue here with what I would call chronic exposure for internal and trying to fit that into the definition of a discrete incident that's in the regulation, and there seems to be a disconnect here because, you know, if the -- if a chronic exposure occurred over three days (unintelligible) say just walking through the -- through that area is enough to get a -- an exceptionally high level exposure. That's the problem I'm having -- an issue.

DR. MAURO: But Jim, what happens if you say -- if you describe it in a different way. Say listen, we know that there was a time period

which could have lasted many months, maybe even many years, where the concentration in the air spiked to very high levels for some relatively short periods of time because of these bombs. So we know that at this facility, let's say this particular building, over this time period -- which could be many years -- that there were scenar-- situations where people could have been exposed to very high levels for relatively short periods of time. We don't know who those people were. We don't know what their exposure durations were. But one thing we do know is the scenario's very real. So anyone that -- who worked in that facility, that building, no matter what time period -- duration -- but they were there and did go into that building meet the criteria of endangerment. So in a way, what I just described is something that avoids all of these -- what I would call more precise issues that we'd like to address, but there's no doubt what I just said is probably true. That is, if there -- that you -- if you -- if you worked in that building doing your job during this time period, it's -- there is a very real possibility that you were exposed to

an uncontrolled high level of airborne thorium for some period of time that would be considered endangerment.

Notice I just said that without even saying what the doses were, what the time periods were or who the people were. All I said was that -- that certainly that scenario existed. Is that enough -- is that enough for -- for a decision to be made on how to deal and grant let's say the petitioners' request for compensation of people who were at Ames less than 250 days?

DR. NETON: I don't know. I mean we'd have to look at the definition of the class.

DR. MAURO: But did you see what I ju-- did I -- see, in -- in effect, I just did that. I threw -- I'm throwing sort of like the gauntlet down.

DR. NETON: Well, I don't know what you did.

DR. MAURO: Why -- why couldn't that be it?

DR. NETON: The way you described that, to me, is anybody who ever worked there, walked through the plant, is in the class.

DR. MAURO: That -- during that time per-- during a given time period and a given building.

DR. NETON: Right.
DR. MAURO: Yeah, that -- that -- I'm putting that down as something to shoot at.
DR. NETON: Yeah.
DR. MAURO: Why couldn't -- why wouldn't that make sense, to define it in those terms?
DR. NETON: Well, as a health physicist, would you believe that someone who walked through a building for five minutes had an exceptionally high level of exposure or even had a reasonable potential to get 50 percent POC? I mean --
DR. MAURO: I agree with that. I would say you're absolutely right, because if it's only five minutes -- but the -- the problem -- to get to the level you'd like to get at -- let's say you did say well, we know it's five minutes. Well, that's just equally impractical because how do you determine if a person was there -- you know --
DR. NETON: I agree with that.
DR. MAURO: -- for less than five minutes, you know. So I think that the -- even if we knew -- even if we were to solve for that time, it doesn't help us make good decisions.
DR. NETON: Well, I think at some point,

though, you would have to refine the class definition for the -- and this is what I started off the day with -- for those less than 250 days, you'd have to somehow, if possible, more narrowly define that class. If it is only workers who worked in the thorium area that had these exceptionally high -- 40, 50, 100 -- MAC air samples. Now whether that can be carried out by the Department of Labor is another issue because we always have to be sensitive to them being able to administer that class.

DR. MELIUS: Well, but on the Nevada Test Site, I think what I hear you're saying, Jim, is that you can -- we can do external dose, but for internal dose, we can't. And so you're saying then for -- if the internal dose is only for a day, you can't calculate it, so theoretically you could have somebody in -- you know, their external dose gets them to 49.99 percent -- you know, that increment of internal dose could put them over --

DR. NETON: That's another issue when you start adding the internal back to the external --

DR. MELIUS: No, I know, that's --

DR. NETON: I don't know how to deal with that.

DR. MELIUS: -- that's another complication to this, and yet it seems to me that, you know -- now if we could -- if you can say you can estimate it 'cause it's a shorter time period or there's some way of bounding it that you couldn't do for a longer time per-- I mean I don't know what -- how you --

DR. NETON: I don't know. I mean once you start adding the external plus the internal, that adds another dimension.

DR. WADE: Just for a moment -- has Mark identified himself as being on the line? Mark, are you --

MR. GRIFFON: Yeah, yeah, I'm here. I -- I just -- and I'm -- I'm listening. I -- I also feel that -- I -- I was sort of leaning toward Ted's -- you know, the -- the notion of presence because I'm -- I'm grappling with this -- this is really deja vu, though, this whole discussion, but --

DR. NETON: It really is.

MR. GRIFFON: -- I'm grappling with this -- this notion of -- you know, if you try to define that time frame, Jim, I think you're -- you know, you're -- you're down to -- I -- I'm

drawing out your 3-D matrix here on my scrap paper, but you know, we're back to --

DR. ZIEMER: I think it's actually 4-D.

MR. GRIFFON: -- well, if you can do all that, then you can -- you can calculate a plausible upper bound. I mean you can estimate -- you can quantify intakes. And the point of all this is that we can't quantify the intakes so that sheer presence -- but I would say that presence of a -- then, you know, we've got to define -- then we're back to defining discrete incident.

DR. NETON: Exactly.

MR. GRIFFON: And how do you define discrete incident? It's got to be sort of a qualitative definition, I guess, because --

DR. NETON: Right.

MR. GRIFFON: -- you know, we can't give it a rem -- you know, we can't -- because of the points you made earlier, we can't quantify that.

DR. ZIEMER: Currently the way -- the way the reg is written, it already talks about discrete incidents and presence, doesn't it -- presence during a discrete incident?

DR. NETON: Yeah.
DR. ZIEMER: That's already in the reg.
MR. GRIFFON: Right.
DR. ZIEMER: So you don't have to sort of re-- we don't have to come up really with a new definition, as long as we're not dealing with this steady-state thing and trying to change those days.
So then it -- then it boils down to two things. One is, can -- how well can you define the time frame for the incident, 'cause then presence becomes pretty clear-cut. And I thought I heard you saying you -- somebody's got to establish that the incident occurred, either through affidavits or something. Right? Or -- or external evidence of some sort. And -- and if an incident is defined -- I mean if it's agreed that it has occurred, you usually put a boundary on it probably occurred between this day and this day?
DR. NETON: Right. But the problem with that is, though, when you get to places like Ames, we're not talking about discrete incidents anymore. We're talking about --
DR. ZIEMER: A steady state.

DR. NETON: -- chronic operations, steady state.

DR. BEHLING: Well, we have two things. We have --

DR. NETON: Well, you've got the bombs, but let's -- let's -- that aside, 'cause that's more easy to deal with, I think. But when you've got a --

DR. ZIEMER: I mean if -- if it's a -- if it's a steady-state thing, you're into the other category. If it's a discrete incident --

DR. NETON: Well, not necessarily, because Hans is pointing out here that you've got a 145-rem bone dose for one-day exposure of a -- of a chronic situation that could have persisted for months.

DR. MAKHIJANI: And most of that exposure would come from maybe half an hour or an hour exposure.

DR. NETON: It's not really an incident at this point; it's a chronic plant condition that we're (unintelligible) define at what point is it less than 250 days to grant a status (unintelligible) --

DR. MAURO: But Jim, this is John, let's think

about if -- I'm a worker. I worked -- I worked at Ames. Okay? And I developed lung cancer. And -- and I -- and I say to mys-- I tell you, tell everybody there before the Board, listen, you know, I was there -- I don't know how long I was there, but it was certainly less than 250 days. I wasn't there for -- but it was actually -- but I did spend time. I don't even know how much time, but I could demonstrate that I spent some time in this building, this building that we have data for that says the concentrations at some times for some unknown duration were very, very high, such that it's plausible that I could have experienced a dose to my lungs that was more than sufficient to give me a PC of .5. I mean let's say that's all I could say, and I'm a worker now. I'm thinking of myself. And then you come along and you tell me well, I'm sorry, there -- you know, we're not going to compensate you because we -- you know -- the answer is no, of course you have to compensate that person. I mean for a practical, common-sense point of view, that person who could demonstrate to you that he was there for some time period, even though it was

uncertain, but you know -- we know that the -- that there were time periods, whether due to bombs or due to chronic, were very, very high, where thousand -- where it's not impossible a thousand rem to the lung could have occurred. It's very plausible. What happens if you -- if you folks all agree that it would on-- that it would be fair to compensate this guy, don't -- what we have here is it -- is we -- we avoid so much of trying to over-analyze, we -- we could -- we know that there were scenarios that -- where the exposures for less than 250 days for people who were present there could very well have resulted in endangerment. Once we know that, aren't -- are-- and don't we then know that there are people, at least some people, who should be compensated even though they were there for less than 250 days? Doesn't that greatly simplify what we're trying to do here? Isn't that the only question we have to ask ourselves: Are we being fair to the people who were there for less than 250 days and have come down with a specified cancer? And we have to -- and -- and we have to just make that judgment on a site-by-site basis whether or not we

believe for this site there were conditions such that -- and I think that Ames clearly, in my mind, falls -- that's why I keep sticking to the Ames case, because Ames brings us to a place where there is no argument that potential existed. And once -- once you have that, that the potential existed and there are very real scenarios that could have occurred that we all agree to, then I think that would solve the Ames problem.

Now that sort of gives us a path -- if we accept that, if you buy my premise that I just said, then -- then we have a path, can we do the same thing at more difficult sites where -- where we don't have as good information regarding the magnitude of the doses. You know, for example, now we're at -- then we move off to Nevada and we say well, wait a minute, you know, Nevada may -- the problem there is we don't have scenarios where the doses were a thousand rem to the lung, could have been a thousand rem to the lung or the -- or to the bone marrow. We have doses that are on the order of tens at -- at top end. So all of a sudden we're asking ourselves questions that

are more semi-quantitative, more qualitative, on a case-by-case basis, which becomes a manageable problem. I think, Jim, you would like to come up with some formulization which is quantitative, bright lines. I don't think that's -- I don't think that's going to work. I think the line of argument that -- and what triggered this in my mind was when -- when Ted mentioned this -- it became clear to me in the case of Ames. I'm -- listen, I'm just putting this on the table for consideration, but it's -- that is the -- that sheds a lot of light on how do you deal with this problem, and it becomes one of these common-sense arguments that you deal with on a case-by-case basis when you look collectively at that facility and the scenarios that you believe are real and that real people may have been put in that position.

DR. NETON: Well, John, I think you just basically restated what our regulation says. I mean that's how it sounded.

DR. MAURO: I -- I -- but I mean -- but --

DR. NETON: And I wasn't trying to force us into some complicated formula. What I was trying to point out was the difficulty in

picking -- picking these limits, these values like 100 rem, 50 rem -- you know, we're throwing out all kinds of values, and I said you've got to be careful when you do that because --

DR. MAURO: What -- what I'm saying -- don't -- don't -- well, maybe we don't have to pick those -- a dose.

DR. NETON: No, I (unintelligible) --

DR. MAURO: All we have to do is say do we think that the situation existed. Now the answer is yes at Ames.

DR. NETON: But here's -- here's the scenario, though. Now you've got a regulation that says we have to determine that an exposure occurred that was an exceptionally high exposure, similar to criticality. That's the -- that's the test. That's the qualitative test that we have to apply here.

DR. BEHLING: You -- you only -- however, that's an incomplete statement. If you look at the regulation, it does say -- involves exceptionally high levels of exposure, such as nuclear criticality incidents or events involving similarly high levels of exposure

resulting from the failure of radiation protection controls.

DR. NETON: Right.

DR. BEHLING: That's the second half.

DR. NETON: Right.

DR. BEHLING: And at Ames, you have both of them. You have the explosions, which are similar to a criticality accident; and you have a failure of radiological controls.

DR. NETON: I agree, so the only test to apply then is are those exposures -- do those exposures at Ames meet that test.

DR. BEHLING: I think they meet --

DR. NETON: That's the question.

DR. BEHLING: -- both criteria.

DR. NETON: (Unintelligible)

DR. BEHLING: (Unintelligible) the criticality criteria and the failure of radiological controls is clearly evident by not meeting the 70 MACs. You had 3,100 dpm per cubic meter and those two criteria are clearly met.

DR. MAURO: And I -- and I'll go a step further. Notice we didn't have to talk about what's the lowest dose they got at Ames. What we had to do is ask ourselves is it plausible

that someone could have gotten a dose that was -- that reads what we believe to be an endangerment. Now we're -- we're sort of lucky in a way here because we didn't have to specify what that threshold is. All we had to do is take a look at what happened at Ames and everyone says oh, my God, yes, of course that -- that existed at Ames. Notice a decision could be made regarding Ames without talking about the threshold dose that triggered it.

DR. ROESSLER: But you're only talking about one place, and aren't we here to set some sort of criteria, some sort of definition of a -- an incident so that when we look at everything, it's done with fairness? I think that's our objective.

DR. MAURO: But I -- but I think that using Ames is a stepping stone now. I mean it -- I -- I -- it -- if the scenario that I just described, the definition of -- that I just described is found to be something that -- that intuitively you feel is -- is the fair way to deal with Ames, then the question becomes to what degree can we now use that as a stepping stone in the way we think about it to apply to

Nevada Test Site. And -- and now of course we're going to have to struggle with it and ask ourselves the same questions that we asked ourselves to get to where we got to on Ames where we ask ourselves now okay, how do we use that experience that we all -- if we do agree on it, now let's try to apply it to Nevada Test Site. And where is the challenge in trying to do that? Can we do it? That's why I kept trying to stick to Ames and maybe if we could solve Ames, we -- we have a step -- a step-ladder upon which to move on to solve the more difficult ones.

DR. ZIEMER: John, this is Ziemer. You -- you did put some parameters on there, though, maybe unknowingly. But you specified although it was less than 250 days, that it was a fair number of days. Like it wasn't one day.

DR. MAURO: Yeah, I -- I -- I -- well --

DR. ZIEMER: But see, if we use the current definition, it's got to be -- you -- you can't -- you can't have it both ways. It's presence -- how does it state, presence --

DR. NETON: Presence --

DR. ZIEMER: I want to use Ted Katz's --

DR. MAKHIJANI: The presence of potential exposure during discrete incidents --
DR. ZIEMER: Yeah, presence during discrete incidents --
DR. MAKHIJANI: -- rather than --
DR. ZIEMER: -- would allow --
DR. MAKHIJANI: -- qualified duration of a potential --
DR. ZIEMER: You -- you can't really say well, I've got to have worked there a certain number of days, then. Right?
DR. BEHLING: But doses for discrete incidents, and I think we have to separate discrete incidents as in the case of Ames, with the second have, the failure of (unintelligible) --
DR. ZIEMER: That's what -- that's what I was getting at, is Ames simply a chronic thing with high exposures where you can actually do dose reconstructions or isn't it? See? It -- we either know it or we don't know what those levels are.
DR. BEHLING: Well, we know for one moment in time when the air samples were taken -- well, actually three days that the AEC conducted their survey measurements, but certainly it

would suggest one thing: If you do do it, then a person with even a week's period of -- of exposure at these work stations would have accrued a dose that would clearly be compensable for at least three cancers that we know of.

DR. MAKHIJANI: I have -- I have a question about this long sentence in the rule and what it means suddenly, from the way that Hans read it. It says (Reading) Exceptionally high exposures, comma, such as nuclear criticality accidents --

DR. NETON: Incidents.

DR. MAKHIJANI: -- incidents or other events involving similarly high levels of exposures resulting from a failure of radiation protection controls.

Now I have to admit, the way I read it, I read those two things as separate --

DR. MELIUS: No --

DR. MAKHIJANI: -- examples.

DR. MELIUS: -- they're not. They're not.

DR. MAKHIJANI: High levels of exposure, so high levels -- exceptionally high exposures would apply to both of them.

DR. NETON: Yes. Yes.
DR. MAKHIJANI: Yes, but -- no, no, I agree to that because that's where the comma is.
DR. MELIUS: They have to be discrete.
DR. MAKHIJANI: (Unintelligible) exposures apply to both of them. But the second part I read as being applicable to the kind of situation described at Ames because it did-- high levels of exposure occurring from a failure of radiological protection controls.
DR. BEHLING: I don't see why discrete is (unintelligible) --
DR. MAKHIJANI: I didn't think that both things were necessary to be present, but if high level -- exceptional exposures for a failure of radiological controls or from an incident.
DR. NETON: No, no, no, no, no, no, it's not --
MR. ELLIOTT: It's descriptive --
DR. ZIEMER: It is the incident.
MR. ELLIOTT: It's descriptive of the incident.
DR. MELIUS: It has to be a discrete incident.
DR. NETON: A discrete incident with high level of exposure from loss of radiologic controls. When you had a nuclear criticality incident, you also had loss of radiologic controls --

failure of radiologic controls.

DR. BEHLING: Well, the fact that we're talking about -- again here, we're talking about discrete inci-- or events. We're already talking about multiple things. An event is a discrete issue, but events is plural. I just can't understand why the issue of a discrete element has to be part of the failure of radiologic controls. If it's a chronic, serious problem that renders a person exposed to high levels -- I'm not talking about minutes, seconds, like a pulse of (unintelligible) neutron gamma ray exposure from a nuclear criticality accident. We're talking about a short period of time, but certainly more than seconds, minutes, or even hours and -- and I read that second sentence for the -- to -- to apply to that kind of condition, failure of radiological controls.

DR. NETON: But it would have to be a defined incident.

DR. BEHLING: Well, if it's a chronic problem --

DR. MAURO: Let's -- let's -- let's talk about that a little bit --

DR. MELIUS: No, let's not.
DR. MAURO: -- it seems very important --
DR. MELIUS: John -- John, let's not talk about it. We're going to take a ten-minute break.
DR. MAURO: Okay.
DR. WADE: Can I just -- going into the break, again, remember the Secretary will make decisions based upon the regulation, based upon the rules. The Board needs to think about that as it makes its recommendations. Now the Board could also say to the Secretary we think the rule needs to be modified in some way. And again, all those options are available to you, but again, the Secretary will make his decisions based upon the rule as it's written.
(Whereupon, a recess was taken from 10:03 a.m. to 10:21 a.m.)
DR. MAKHIJANI: (Unintelligible) you on, Kathy DeMers?
MS. ROBERTSON-DEMERS: Yeah, yeah, I am.
DR. MAKHIJANI: What document did you read to me on the phone?
MS. ROBERTSON-DEMERS: It was the test managers authority letter for Project Nougat.
DR. MAKHIJANI: Jim, could you have -- I'm not

sure I wrote all the words down accurately 'cause I had the phone (unintelligible) like that. Could you have -- would it be appropriate to have Kathy read that definition (unintelligible) --

DR. MELIUS: Yeah, let me just get -- we need to go back on the record and --

DR. WADE: Yeah, we need to go back on the rec-- now again, I would ask for Board members present on the call to identify themselves.

(No responses)

Mark, are you with us?

(No responses)

DR. MELIUS: He has (unintelligible).

DR. WADE: He will be again.

DR. MELIUS: Yeah.

DR. WADE: Mark, I don't know if you're muted. Are there any other Board members on the line? We do have Wanda Munn in the room with us. We are still under quorum so we can continue our business. You can stay, Wanda. We want you to stay.

Okay, we're back on the record then.

DR. MELIUS: And Arjun was -- Kathy, do you want to read that -- identify the document and

read that phrase or whatever.

MS. ROBERTSON-DEMERS: Okay. Just let me kind of give you some background.

DR. MELIUS: Yeah.

MS. ROBERTSON-DEMERS: When we go to each site, over time they've established limits or action levels where they will consider something an incident, and those action levels in the early days are quite large compared to what we would tolerate right now, so you need to consider, at each facility, what they defined as an incident, because anything below that will not be called an incident. However, we may call it an incident in the perspective of today.

And what I had found was the test managers authority report from Operation Nougat, and it was dated 1961. And this is how Nevada defined an incident.

(Reading) The term "incident" has been understood by NTS organizations to cover those situations of unexpected or accidental types of overexposure and not situations where minor exposures in excess of normal working levels have been required to accomplish the necessary required objective when considered justified by

the project or test manager.
So anything that isn't called by -- by the Nevada Test Site an unexpected or accidental overexposure would not meet their threshold for incidents. And when we go and we examine records, we normally have them pull the incidents. But we have to keep that in mind because there may have been incidents that were not documented because they didn't reach the criteria of the site at the time, which was quite high. And I just wanted to bring this up and have you guys keep that in the back of your mind as you're having this discussion. Each site tends to have different incident thresholds, and I think it's important in the consideration of incidents that potentially were not identified. When you have a large incident at a DOE site, it's typically documented. However, something right below that threshold will -- will not be documented.
DR. MELIUS: Okay, thank you, Kathy. I thought that rather than continuing our Ames debate that we try to go back and sort of think about an approach -- and Arjun and I talked a little bit at the break and so forth and -- that --

that maybe one ap-- I think the critical thing is how do we sort of come up with some way of categorizing or recognizing what are discrete incidents that -- that sort of fits the definition and the -- the regulation. And if there may not be sort of a single criteria for that, you know, number of rems or whatever, but -- but rather than maybe a set of criteria that we would want to look at in evaluating those -- tho-- those situations that may include a -- a number of -- of different factors and, you know, dose rate, the nature of the incident, absence of radi-- normal radiation controls and so forth and that what we could do is sort of develop a series of sort of those general criteria as the way of -- of evalua-- of evaluating the incidents that we would encounter at -- at particular sites, but it would still be a judgment on that particular in-- incident. And I was just wondering what people's reaction was to that sort of an approach, that -- that if we -- that that will give us a place to start from, and then -- then there would be, you know, the issue of how that -- how that would qualify and then how you

actually implement -- implement that in terms of health endangerment and so forth. Paul?

DR. ZIEMER: I like the concept of doing that, and I would suggest that maybe it would be useful if we got a number of ideas on the table, without necessarily have to agree or disagree to them right now, but get some different perspectives on this and -- and starting with the fact that what DOE defines as an incident now is not what we're talking about. DOE typically will define anything as an incident where it's outside of a management control.

DR. MELIUS: Yeah.

DR. ZIEMER: If you exceed a dose limit without going -- I mean there are -- there are ways you can exceed dose limits in DOE, and even with NRC, if you do certain management things. But in any event, it -- it's not the same definition anyway that DOE uses so --

DR. MELIUS: Right.

DR. ZIEMER: -- again, this is more like an event or something.

DR. MELIUS: Yeah, I think -- yeah, I --

DR. ZIEMER: It's a -- it's a high-dose event,

but I like the idea of getting the parameters down and then we can look at those and see if they make sense.

DR. MELIUS: This'll be sort -- how do we judge if it's a discrete incident likely to have involved exceptionally high exposures, and then -- you know, there's some other qualifications there, but I think it was -- sort of -- how the working group would -- would approach this is let's do what Paul suggested, you know, talk about -- about different things, put some ideas out there, then ask SC&A to sort of take those ideas and -- and suggestions and come back to us with a -- you know, a -- maybe it's a one-page or -- I don't know, how long it -- it wouldn't be very long, that would try to capture those in some sort of coherent way that would -- that could be operationalized for look-- looking at -- looking at such incidents, and then -- then as we progress through -- you know, two ways. One, can we come to an agreement on that, and then secondly, how do we apply that in -- in some of the situations in front of us such as, you know, Nevada Test Site and so forth -- makes sense. Is that -- Jim

and Larry, does that make -- helpful from your point of -- point of view?

DR. WADE: Administrative detail -- on the phone we're getting an awful lot of background noise from people clanging dishes to blowing their nose, so if you could mute.

MR. ELLIOTT: Yeah, that sounds...

DR. MELIUS: Okay.

MR. ELLIOTT: (Unintelligible)

DR. MELIUS: Actually try to give someone an excuse not to do the dishes, so -- okay, who wants to start? Go ahead, Paul.

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DR. ZIEMER: Let me start with one I think probably won't be very controversial, but any incident that results in non-stochastic or deterministic effects; i.e., clear blood changes or -- it's basically the standard radiation high-dose effects.

DR. MELIUS: Yeah.

DR. WADE: Others?

DR. MELIUS: Arjun, you rattled off a...

DR. MAKHIJANI: Well, I was thinking of some of the data from Nevada Test Site where there were situations with quite high dose rates, and we

know that there were people in those environments that -- 25 rads per hour or 50 rads per hour -- flying through the cloud, sampling emissions -- 100 rads per hour. I'm wondering -- I was wondering in that context whether dose rates that were very high -- say on a per hour basis that could produce deterministic effects and we know there were people involved, but that might be -- sometimes you cannot -- sometimes you can actually determine how long people were there because you have -- you have documentation for what the operation was planned to be, but sometimes you can't -- at least sometimes you don't know how long people -- sometimes you have a dose so you can infer how (unintelligible).

DR. ZIEMER: High dose rate situations are fairly common, both in the labs and in -- in private sector where you determine in advance work times which may be as -- as short as one minute. I've had cases where we sent electricians in to do something for one minute, then the next guy comes out -- or gal -- and does the next step. And you -- you -- you're -- you can be talking about ten, 20 to 30 rads

per hour working in -- close to reactors and so on, but you can -- and so you control doses by -- by time. So the presence of a high dose rate, per se -- now if you're talking about hundreds of rads per hour, then it becomes very difficult to control, so --

DR. MAKHIJANI: No, what I was thinking was --

DR. ZIEMER: -- but if -- but if you can show those exist and you're not controlling entries or something, then it's --

DR. MELIUS: Yeah, I don't think these are, you know, separate criteria. They're going to --

DR. ZIEMER: (Unintelligible)

DR. MELIUS: Yeah, in some way, 'cause I'm not sure we can come up with -- or it'd get very complicated if we did.

DR. MAKHIJANI: No, I agree that -- that -- I mean obviously the failure of radiological controls along -- along with --

DR. ZIEMER: But we should -- we should get the ideas down here --

DR. MELIUS: Yeah, yeah.

DR. ZIEMER: -- and then we can -- so it's high dose rate?

DR. NETON: (Unintelligible) define high dose

rate as .5 to 50 rem -- rem per hour, is that what you said?

DR. MAKHIJANI: Well, I was thinking if -- if there's a level -- if there's a level you decide is a non-stochastic or deterministic effect, then perhaps it's a suggestion that that dose rate per hour might be an important thing to factor in as one -- one consideration.

DR. NETON: (Unintelligible) can offer up what's in the regulation already, which is an incident which involves the administration of chelation therapy.

DR. MELIUS: Uh-huh.

DR. NETON: That would, in my mind, qualify as something that at least had the potential to be a very high dose.

DR. ZIEMER: Maybe we can define what high dose rate is later. The point is to get the ideas down.

DR. NETON: At least fall in the category of "this might be a high dose rate if".

DR. MELIUS: No, I think it's -- there are always going to be -- not by themselves a, you know, sole criterion, but it would be in -- you know, in combination with failure of radia--

you know.

DR. ZIEMER: I mean you can argue that a medical X-ray's a high dose rate event; it is. I mean you -- a tenth of a second and you get some of these -- you know, in the early medical ones -- a rad. Those are high dose rate things.

DR. NETON: An example might fall in the line of deterministic effects but I was thinking in terms of some evidence of some renal toxicity from uranium exposure or something on that line, kidney toxicity.

THE COURT REPORTER: I'm sorry?

DR. NETON: Medical evidence of kidney toxicity.

THE COURT REPORTER: Kidney.

DR. NETON: We have to be careful with that 'cause some-- sometimes you can have fairly low doses from very soluble uranium and you have kidney toxicity. Those were soluble materials --

DR. ZIEMER: Well, yeah, in fact the chemical toxicity is overriding for uranium in some cases.

DR. NETON: Right, but I was -- what I was

thinking is you had fairly moderate to insoluble uranium and had evidence of kidney toxicity, that would clearly support -- in my mind -- a very high exposure.

DR. MAKHIJANI: But now you're into the high exposure realm, and then add -- that would be combined with incidents in some way?

DR. NETON: Right, well, that's what I was thinking. I thought we were trying to bracket some high exposure criteria that would define --

DR. ZIEMER: Verify that an incident occurred.

DR. MELIUS: Discrete incident likely to involve exceptionally high exposures, how do we --

DR. MAKHIJANI: This is what I --

DR. MELIUS: Yeah, how do we put parameters on that some way or make some evaluation.

DR. ZIEMER: Can you separate that, do you think, from chronic uranium uptake?

DR. NETON: That's a good question. You really can't. But a discrete incident could result in this effect, as well a chronic --

DR. ZIEMER: Right.

DR. NETON: -- as well.

DR. BEHLING: As you know, in the Ames situation there was evidence of renal problems.
DR. NETON: Early on, yeah.
DR. BEHLING: But of course it has to be likely that it obviously was chronic exposure that led to that, rather than a single discrete event.
DR. NETON: I don't think it has to be.
DR. BEHLING: You couldn't differentiate.
DR. NETON: You couldn't, but I'm just throwing these out. I mean --
DR. WADE: Okay, just making a list.
DR. NETON: -- these are not --
DR. ZIEMER: Do you know what -- what the -- Hans, the time is for renal effects on uranium vers-- I mean --
DR. NETON: I think it can be fairly quick if the --
DR. ZIEMER: A week or two?
DR. NETON: Yeah, very short. We used to test fairly quickly after an incident or a -- protein albumin urea for a gross test, but... And then this would have to be bracketed in terms of the types of tests. There are now some real very sensitive tests that can measure deterministic effects for extremely low levels

of exposure. I was thinking in terms of the classic tests they were apt to use.

MS. ROBERTSON-DEMERS: This is Kathy DeMers.

DR. MELIUS: Yeah.

MS. ROBERTSON-DEMERS: Can I propose, in terms of iodine-131, 132 and 135, that you look at detriment to the thyroid in (unintelligible)?

DR. MELIUS: Uh-huh.

DR. NETON: These, so far, have been sort of indirect indicators of high exposure, but would -- would something such as -- you know, I'm thinking of an explosion of an ion exchange column like at the Hanford facility. That, to me, is a...

DR. MELIUS: (Unintelligible)

DR. NETON: There's very concentrated amounts of transuranic materials present in these columns when they're extracting them.

DR. MELIUS: No, I'm just trying -- how do we turn into a more general criteria so it's not -- you know --

DR. NETON: I agree, yeah, that --

MS. ROBERTSON-DEMERS: Actually, Jim, wouldn't that kind of fall under the chelation category?

DR. NETON: It would, it would. See, that's

what I was trying to -- I didn't know whether we wanted to go with just these sort of indirect medical indicators and deterministic effects, or whether we wanted to really cite examples of activities that could have happened or, you know, scenarios that could result in a high exposure. Certainly you would have a chelation indication at that point, but --

DR. ZIEMER: I mean these are -- these are items -- you wouldn't necessarily take any one of them by itself, but it would be an indicator.

DR. MELIUS: Uh-huh.

DR. ZIEMER: So what -- what would be the general thing to -- an explosion, a laboratory explosion?

MS. ROBERTSON-DEMERS: What about a situation that resulted in significant medical treatment? In that case he lived at the hospital.

DR. NETON: Yeah.

MS. ROBERTSON-DEMERS: But you might get a situation where -- for example, at Rocky Flats one of the individuals was involved in an explosion and he actually lost part of his hand, but he had a substantial potential for

intake through his rather substantial wound, and he received extensive medical treatment also.

DR. MAURO: Would you want to leave -- limit that to medical intervention because of concern over radiological exposures?

DR. NETON: Yeah, that would be a (unintelligible) --

MS. ROBERTSON-DEMERS: Yeah.

DR. NETON: -- general category.

MS. ROBERTSON-DEMERS: Yeah.

DR. MELIUS: And then you'd have a whole subset (unintelligible).

DR. NETON: That would apply to internal and external.

DR. MELIUS: Yeah, right.

MS. ROBERTSON-DEMERS: What I'm trying to avoid is treatment for minor wounds.

DR. MELIUS: Yeah.

DR. MAKHIJANI: What about these -- when you're talking about explosions and Hans -- Hans brought up the question of bombs and how do you -- how do you consider the -- the -- the explosions of the bomb, for uranium and thorium especially, and (unintelligible) --

DR. NETON: Yeah, we -- we talked about that. I mean this -- this sort of falls -- Hans and I had a little sidebar conversation on this. This falls into these acute incidents that we've always talked about -- you know, in the plant. Often normal things happen and puffs occur. The question is to decide do they rise to this exceptionally high level. And certainly we would welcome an analysis of -- of an explosion due to one of these uranium bombs or the thorium bombs. But our opinion on this so far has been that when those occur there's usually an immediate evacuation of the area. People don't hang around very long so that you have a high exposure for a very brief period of time that doesn't end up, like at the end of the day, resulting in a -- in a dose that is that high -- exceptionally high, at least. And in fact, most of these are covered by what we believe to be the routine bioassay program where we can demonstrate that even -- even given those, the bioassay results don't indicate these high levels of exposures. But I think in general some -- some analysis of -- I think any time there was a potential for an

explosion involving large quantities of radioactive materials, it certainly would at least raise the flag in my mind that there was a potential for a...

MS. ROBERTSON-DEMERS: This is Kathy DeMers again. With respect to explosions, could we add substantial fires to that, on the order of the 1969 fire at Rocky Flats?

DR. MAKHIJANI: When we're talking about fires, they had some pretty intense fires in the thorium drums at Fernald. They had all kinds of fires. You know, you have small chip fires and you have large -- you have fires across the scale of -- and some fires are -- what could really be considered as routine, where they're small and you treat them as routine exposures in your (unintelligible), but there are some that are clearly exceptional.

DR. NETON: Right, I would agree, there are fires that would occur that were large, for example, that we were not able to reconstruct using bioassay or -- there's a lot of these that we've been talking about. I think there are tools that we have available to bound exposures. You know, you have to have this as

a precondition, plus an inability to (unintelligible) air samples or bioassay or any of those other (unintelligible).

DR. MELIUS: Yeah. No, I think it's assumed that -- this is not assuming that you can't reconstruct --

DR. NETON: This is to get you in the analysis.

DR. MELIUS: Yeah, how do we -- how do we -- for an actual individual to get in here, they would -- for these purposes, they -- not be able to reconstruct their dose, also. And I also think this is sort of the failure of radiological controls or routi-- you know, is sort of going to be fundamental to a lot of these kinds of incidents 'cause, you know, if everybody's sort of evacuated immediately, it's not...

DR. MAKHIJANI: (Unintelligible) let me bring up my favorite example from Fernald, the one that shocked me the first time I saw it and still shocks me when I think about it, is that famous 97,000 times MAC cleanout where it was averaged over some time -- you know, I mean trying to fix it -- and the second year it was 18,000 times MAC. But -- and that kind of

cleanout happened only once in a long while, so it wasn't part of a routine job, so it's not like the Ames situation we're talking about but -- where they went in and shut down the equipment and cleaned out this place, and it was a very intense, few-hour operation. It was clearly --

DR. NETON: But it was a planned event.

DR. MAKHIJANI: It was a pla-- it was planned, but the -- there were -- there was clearly failures of radiological controls and very extreme exposures. I don't know (unintelligible) --

DR. ZIEMER: Now are those cases where the exposures were or were not monitored?

DR. MAKHIJANI: Well, I don't know. I mean --

DR. ZIEMER: I mean you had similar situation with the SL-1 recovery.

DR. MAKHIJANI: Right.

DR. ZIEMER: Pretty high exposures, some of those folks who went in to rescue and so on, but they were also monitored pretty closely, so I mean in general one would have been able to reconstruct those doses. On -- on the case you're talking about, were those -- do we have

-- would there have been data? It sounds like you --

DR. MAKHIJANI: Yeah.

DR. ZIEMER: -- they knew pretty well what they --

DR. MAKHIJANI: Yeah, they may have monitored them. I'm not -- I'm not using this as an example of -- I'm just saying if -- if that kind of situation occurred in the context of an SEC, I wasn't saying of, I know of an (unintelligible) --

DR. ZIEMER: As an indicator of an incident.

DR. NETON: I would agree if you had 18,000 MAC air unmonitored, that would qualify as a discrete incident. That's up there so high that I can't imagine you can generate air that high, but --

DR. MAKHIJANI: Well --

DR. NETON: -- apparently they did.

DR. MAKHIJANI: -- it's -- it's what the document said.

MS. ROBERTSON-DEMERS: This is Kathy. I think when you're talking about failure of radiological controls, you need to define what type of failure you have in mind, because in

today's world if you spread contamination outside a contamination area, that's failure of radiological control. And I don't think you mean at that level.

DR. ZIEMER: No.

DR. MELIUS: I think it -- that's always going to be a subsidiary or a secondary way -- it's a way of evaluating the initial incident, and it would be a failure of the controls that should have been in place relevant to that particular type of exposure and incident. You know, not simply, you know, any failure of radia-- you know, radiological controls. I mean I can't think of an example where you just base it on that alone, you -- it would be failure to evacuate people in some of the incidents Paul was talking about, failure to monitor --

MR. ELLIOTT: Failure to adequately monitor --

DR. MELIUS: Yeah, right.

MR. ELLIOTT: -- knowing full well that --

DR. MELIUS: Yeah.

MR. ELLIOTT: -- it's gone beyond the radiation control area.

DR. MELIUS: Yeah, exactly.

MR. ELLIOTT: Failure to clean up, and still

send people in to work there.

DR. MELIUS: Yeah, yeah. And like what Paul said, you know, the -- you used a -- was it a Fernald incident or what that -- where people away from the -- I mean other people were exposed, but they were monitored and so forth so they wouldn't be part of the --

DR. MAKHIJANI: No, no, I just used that number --

DR. MELIUS: No, no, I'm just trying to --

DR. MAKHIJANI: -- (unintelligible) my mind.

DR. MELIUS: -- make sure we have an understanding of how we're applying this -- or would apply this.

DR. NETON: The external area -- the failure of any interlock systems that were in place for protection of high dose rate exposures, there's a number of those that have occurred. We've actually dealt with a few of them. The famous one down at Oak Ridge I remember, wasn't it the agricultural facility?

DR. ZIEMER: The U of Tennessee Ag and -- where the guys bypassed the interlocks and went in, yeah, that -- that's a good example. And of course they had separate monitoring. They

pretty well --

DR. NETON: Yeah, if they're unmonitored --

DR. ZIEMER: And those are easy to reconstruct anyway 'cause you have discrete sources, but --

DR. NETON: Yeah.

DR. ZIEMER: -- but what would be the indicator there, the first...

MS. ROBERTSON-DEMERS: Along that line --

DR. ZIEMER: And those are -- yeah, those are oft--

DR. NETON: Well, we'll reconstruct it later -- after the fact.

MR. ELLIOTT: Along the line of we'll reconstruct it, we're having workshops across the street for DOL's FAB and claims examiners, and today their resource center folks. One of the questions that came out of that is why isn't the SL-1 incident already established as a class, and -- and to this discussion, certainly the cleanup activities that occurred after SL-1, to go in and retrieve the bodies and, you know, do all that cleanup, while it was well monitored, it was certainly a huge exposure that those individuals got, you know. So if there was a failure somewhere there --

you know, I don't know if that goes to the incident that we're trying to define, but it certainly is an exposure incident. It's -- it's a unique set of circumstances that people encountered. And if we couldn't -- you know, if there was some component there that was missing in the monitoring and we couldn't reconstruct dose, how would we define, you know, the time period around that.

DR. ZIEMER: Well, in that one, you know very specifically what dates it occurred on, who the people are --

MR. ELLIOTT: But under our current rule --

DR. ZIEMER: Yeah.

MR. ELLIOTT: Yeah, on that one you clearly know when -- when the ex-- the doses started going down on the people that they were monitoring after the cleanup and we can define the time limits, but it wouldn't meet our, you know, current definitions, you know --

DR. MELIUS: Why not?

MR. ELLIOTT: 'Cause it wasn't 250 days. It was only like --

DR. MELIUS: Yeah, but --

MR. ELLIOTT: -- I believe 60-some --

DR. MELIUS: No, I thought you were talking about it would be a discrete incident --

UNIDENTIFIED: High dose.

DR. MELIUS: -- yeah, high dose.

MR. ELLIOTT: High dose.

DR. MELIUS: Yeah -- okay. I thought you then (unintelligible) --

DR. MAKHIJANI: Let me understand. Would cleanup for 60 days be a discrete incident?

MR. ELLIOTT: I'm just saying it could be considered that. I mean it could -- as you're talking about these things, I --

DR. MELIUS: Yeah.

MR. ELLIOTT: -- it occurs to me that, you know --

DR. ZIEMER: Well, the -- but to me, the cleanup -- see, those -- those folks were working under -- at least under dose limits. For -- for rescuing they're allowed much higher values, although they didn't really have to rescue, the people were already dead from the explosion, but they had to remove the bodies. I think Ed Valleria* was the guy who got the high dose and --

DR. NETON: I do agree that a discrete incident

could be a 60-day event.

DR. MELIUS: Yeah.

DR. NETON: I don't think there was any intention to -- to limit a discrete incident to, you know, a day, an hour, a second.

DR. MELIUS: Yeah.

DR. NETON: But it would have to be -- it'd be hard to envision those scenarios like -- like Dr. Ziemer's pointing out, and the cleanup really was a planned event. Now they were monitored. Maybe there was some failure of radiologic controls there, but --

DR. WADE: But at this point you're trying to look at --

DR. NETON: Yeah, we're not trying to --

DR. MELIUS: Yeah, yeah, yeah, yeah --

MR. ELLIOTT: Such an event might have been in the time period where they didn't have the monitoring practices (unintelligible) certain constituent of the exposure.

DR. WADE: Yeah, it should be on the list.

MR. ELLIOTT: I guess that's my only point there that I'm trying to make.

MS. ROBERTSON-DEMERS: What about if we looked at people who were allowed to exceed the dose

limit in an emergency situation? In other words, they were authorized to receive the emergency dose --

DR. NETON: Authorized and monitored or unmonitored, I guess?

MS. ROBERTSON-DEMERS: Well, I would hope that --

DR. NETON: Monitored?

MS. ROBERTSON-DEMERS: -- monitored, if they had to request that type of dose. However, there may be some situations in which they weren't.

DR. NETON: Well, I think -- yeah, I think that would qualify if there was a life-saving -- some guys just ran into an area without any dosimetry and pulled a guy out and -- sure.

DR. MELIUS: I mean some of the incidents that are described here --

DR. MAKHIJANI: I think there's one -- there's a couple of incidents --

DR. MELIUS: There's a couple of them, too, where that appears to have happened, at least from the work description.

DR. MAKHIJANI: At Nevada I think there were two.

DR. NETON: Okay, I'm kind of running out of --
DR. ZIEMER: If we're looking at indicators that something has occurred, one of the indicators often is the contamination shows up at some other location, either a home or something like that, and you can use that as an indicator that there's been some kind of loss of control. I don't know if that's a practical thing 'cause you don't end up getting that information necessarily, though.
DR. NETON: Sometimes we do. There's an interesting one where -- followed a guy out to his baseball game and -- I won't give the details, but he had contamination -- various parts of his body. And I don't know about that one. I don't know if that gets to the level of significant -- you know, I guess (unintelligible) --
DR. ZIEMER: No, as an indicator that something has occurred. Only as an indicator, as a potential indicator that there's been loss of control. I'm trying to think of specific cases.
MS. ROBERTSON-DEMERS: That's a hard one to deal with 'cause routine --

DR. ZIEMER: Yeah, in terms of the information that we're able to get ahold of, it is.

MS. ROBERTSON-DEMERS: With the -- the early contamination control measures, especially for uranium, they may have been taking it home on a daily basis --

DR. ZIEMER: Right.

MS. ROBERTSON-DEMERS: -- and nobody would have thought to monitor them, or monitor their home.

DR. ZIEMER: Right.

MS. ROBERTSON-DEMERS: And they didn't have personnel contamination monitors to indicate that they had that contamination on them.

DR. ZIEMER: Good point.

MS. ROBERTSON-DEMERS: This would especially be relevant to AWEs.

DR. ZIEMER: Uh-huh.

DR. MELIUS: Do you think from this list you --

DR. MAKHIJANI: Yeah, I think --

DR. MELIUS: Yeah.

DR. MAKHIJANI: I've made notes and I'll -- I'll work with Ray maybe to get a piece -- this piece of the transcript roughly early. But I had a question. When you compile some -- compile this list of criteria --

DR. MELIUS: Yeah.

DR. MAKHIJANI: -- and then you try to apply it to the less-than-250-day, who do you apply it to? Do you apply it to everybody who worked that -- who's qualified as an employee by DOL and worked there, so then presence -- once you go through these criteria, then presence is enough during those 250 days or employment at another time or how do you translate these?

DR. ZIEMER: Currently.

DR. NETON: I -- I think you need -- you need to define the class based on that. If you define the incident well enough, you'll define the class. It will be those workers involved in this incident in this particular building at this -- I mean ideally it would be that.

DR. MAKHIJANI: Yes.

DR. NETON: Now whether in reality one can tie people -- bodies to those -- that incident is another story, but you at least have to start there. Say here's what I'm talking about, this -- this bomb incident occurred on December 15th, whatever. And -- and then you narrow the class to as small as it needs to be without engaging, you know, the entire plant population

(unintelligible) --

DR. MAKHIJANI: But then we've shifted the question. These are different -- sorry.

DR. WADE: It will be different for different discrete incidents. Once you define them, then how you go about defining the class will depend upon that definition.

DR. MAKHIJANI: But this is a different question than the one we started the meeting with, as I see it. Maybe I'm mistaken, because where we started the meeting with, there was this SEC that's been granted -- say at Nevada Test Site or Ames or someplace --

DR. MELIUS: Uh-huh.

DR. MAKHIJANI: -- where there was a group of employees that was defined in a certain way who worked with uranium or thorium or were employed at Ames or people who -- there during atmospheric testing. And then everybody who was there at least 250 days is in. And I thought the question on the table when we started the meeting was: In that group of people, what about everybody with less than 250 days?

And now I guess what we're saying is we're not

going to consider that whole group as one group but we're going to split it apart. Is that what we're saying?

DR. MELIUS: We could. I think we're just --

MR. ELLIOTT: If you applied -- if you applied this against our rule right now, and we said that there was a unique incident here that contributed to high dose but it wasn't really truly presence, and whatever the -- let's forget the day issue --

DR. MELIUS: Uh-huh.

MR. ELLIOTT: -- then -- and we know that -- what that incident was and -- and where it was, at least, then the class definition would be bounded by that.

DR. MELIUS: Uh-huh. Yeah.

MR. ELLIOTT: And so that's a lot narrower definition of a class than what you have before you now with -- with saying all who worked at Nevada Test Site under those years.

DR. NETON: It doesn't mean that you couldn't end up at the same place, but I think you've got to start with a narrow definition of -- of a discrete incident, investigate it and -- and work around. Now if you can't bracket the --

any smaller than the entire site and it looks like anyone on the site could have been involved in this incident, then that's a different story.

DR. BEHLING: Let me give you an example of that because Ames -- there were fires and because of the --

DR. NETON: Yeah.

DR. BEHLING: -- issues involving national security, firefighters -- as you see in the cartoon -- were told you can't come in here, we fight our own fires. So now it's employees fighting a fire and, as we just mentioned here, fire may be one of those discrete events that may lead to high exposure. But we don't have a clue who the people were who may have fought those fires within the ranks of employees. So do we then identify the entire cohort as less-than-250 eligible? We don't know who the firefighters were who were (unintelligible) --

DR. NETON: Well, that -- that's where we need to work, you know, with the Department of Labor in defining the class so you know it can be administered.

DR. WADE: But one thing at a time. I mean --

DR. MELIUS: Yeah, but I think the difference that -- back to what Larry was saying, in the 250-day situation we -- we (unintelligible) the relationship to exposure or some threat of exposure. Here we're defining a -- a different class or a new class in relationship to incidents. And so I think we are sort of going through -- we know what it -- now we have to develop some inci-- you know, definition of what an incident is, and then -- then I think we have to go through the steps, well, can you reconstruct people and exposure (unintelligible) so you can't, then -- then it's defining it -- we define the class in relationship to that incident.

DR. MAKHIJANI: So we are defin-- we are, in -- in a way, embarked on defining a different class --

DR. MELIUS: Right, right.

DR. MAKHIJANI: -- because of the way the regulation is written.

DR. MELIUS: Right.

DR. NETON: I think so.

DR. MELIUS: Yeah.

DR. WADE: And the step there would be to

define did an incident take place at the Nevada Test Site; here are the beginning characteristics to look for to see if an incident took place. If one did, then you need to go into more detail as to how you would define the class associated with it.

MR. ELLIOTT: Say the petition comes to us and the starting point was there was an incident and there's no data about that incident.

DR. MELIUS: Uh-huh.

MR. ELLIOTT: Then that sets up boundaries of the proposed class itself, and then we have to use the two-pronged test. Can we reconstruct dose based upon what's presented to us as an incident we can't reconstruct.

DR. MELIUS: Yeah.

DR. NETON: A good example of this is I went through and looked at the Nevada Test Site, the 61 who don't currently qualify, and if we were to say, based on the criticality as it happened, the individual tests that would qualify -- many of these people were not there on the days the criticality occurred, and so --

DR. MELIUS: Yeah.

DR. NETON: -- you need to look at that and

define that class.

DR. MELIUS: Oh, no, no -- yeah, sort of how do you operationalize that, the group, and it may -- may end up not being very many people or whatever, we don't know, you know -- you know -- do that.

What I would propose for sort of next steps is -- 'cause I think we do have to figure out how we've been defining these classes so we -- do that -- is -- is to write up these criteria and then let's take and -- take Nevada Test Site and apply it, see if we can, you know, define classes there.

DR. WADE: Define discrete incidents --

DR. MELIUS: Identify the incidents and then define class and --

DR. WADE: Very logical approach.

DR. MELIUS: Yeah.

DR. ZIEMER: And one kind of additional question. It just occurred to me that in many incidences, and I think about the Y-12, the reason we -- we know that that incident occurred, the first indication is an alarm. Now do -- are -- is there any indication that on these sites like Nevada Test Site that

alarms were bypassed or not working, or something like that, in terms of things that -- or were unexpected outside the -- the testing of the devices themselves? I mean obviously the testing of the device is a criticality, but that's -- that's what you're doing.

DR. MELIUS: Uh-huh.

DR. ZIEMER: But were there inadvertent -- or are there claims that there were unexpected criticalities in the handling of the materials?

DR. NETON: I think there were.

DR. ZIEMER: And did they have criticality monitors that would -- would be --

DR. NETON: (Unintelligible) would know better than (unintelligible) --

DR. MAKHIJANI: In at least one case --

DR. ZIEMER: I mean if you have an area monitor of any sort, air sample or whatever, it'll get set off by a criticality if it's in the work area.

DR. MAKHIJANI: I think in at least one of these safety tests they did have a criticality and that was one of the incidents I was referring to. We're pretty sure we -- I didn't say inadvertent in the paper because I didn't

have a reference, but I think -- I'm pretty sure that it was inadvertent, but not 100 percent.

DR. NETON: But -- are you wanting to get into specifics?

DR. MAKHIJANI: Sure.

DR. NETON: The Nevada Test Site -- I think by and large anyone who was positioned near these planned events or even the inadvertent events were monitored for external exposure. I'm pretty sure we've got pretty good data on those. But then the question for Nevada comes as was there an incident with -- involving internal exposure that -- exceptionally high and we have to apply it to the appropriate metric.

DR. MAKHIJANI: Now I think that Nevada --

DR. MELIUS: The -- does the internal exposure have to be exceptionally high?

DR. NETON: That's what the definition is in the regulation.

DR. MELIUS: But -- no, but is it -- now it's back to that issue of parsing out between external and --

DR. NETON: Oh, no, I think the intent was that

it would have to be -- qualify as a discrete incident. For less than 250 days it had to be exceptionally high exposure.

DR. MELIUS: Yeah.

DR. NETON: It was only on failure of radiologic control that whole thing goes together. It has to be an exceptionally high exposure --

DR. MELIUS: I -- I agree to that, but I'm saying does it have to be an exceptionally high -- that's that whole issue you and I talked about earlier, does it -- did it have to be an exceptionally high internal exposure.

DR. NETON: Yeah.

MR. ELLIOTT: It wasn't speci-- the language doesn't specify internal versus external.

DR. MELIUS: Exactly, that's my point.

MR. ELLIOTT: It just specifies exceptionally high.

DR. MELIUS: The point -- I mean this whole point -- you can -- if you can -- you know, you have somebody and you can -- 49.99 percent probability of causation. You have this little --

DR. NETON: Oh, I see what you're -- you can

get to 45 percent based on your external dose and then --

DR. MELIUS: But you can't -- you know.

DR. MAKHIJANI: Need to think about that.

DR. MELIUS: Yeah, yeah, I (unintelligible) --

MR. ELLIOTT: (Unintelligible) partial dose reconstruction.

DR. NETON: I won't comment at this point.

DR. MELIUS: Yeah, no, it --

MR. ELLIOTT: Partial dose reconstructions for those who do not have a presumptive cancer.

DR. MELIUS: Yeah, no, it's -- it's a --

MR. ELLIOTT: It is a problem.

DR. MELIUS: And it may be if -- define what you can and cannot do very precisely --

MR. ELLIOTT: (Unintelligible)

DR. MELIUS: -- much more precisely than we've done -- done -- done --

MR. ELLIOTT: We have to, because it leaves the individual claimant with no remedy on what we can't reconstruct.

DR. MELIUS: Exactly.

MR. ELLIOTT: And we just hate that.

DR. MELIUS: Yeah, yeah.

DR. MAKHIJANI: Okay, so within -- within this

universe of incidents, just thinking about how one would write up Nevada, which is looking -- the criteria look fairly straightforward, but writing up Nevada looks quite complex because now if you're into defining what all incidents there were, then you really have to get into being fairly exhaustive because you're -- you're telling people -- and then you also raise the question of was entry into ground zero shortly after a test an incident? I guess if it was planned, you would say it was not an incident, or people were monitored --

DR. NETON: (Unintelligible) monitored or --

DR. MAKHIJANI: -- if they were not monitored -- they weren't monitored for internal.

DR. NETON: Yeah, we've got some pretty good radiation safety reports for almost all of those (unintelligible) --

DR. MAKHIJANI: Right.

DR. NETON: -- sure you've looked at that and --

DR. MAKHIJANI: Right.

DR. NETON: -- they're very detailed, 200, 300 pages long reports, I -- very planned. Now whether something happened outside of that plan

that was an incident that -- I think Dr. Ziemer was alluding to was were there things that went awry that --

DR. MAKHIJANI: No, no, what I'm asking is -- as you said, during those planned activities, there were external exposures that were monitored. But there were also internal exposures, on the basis of which you granted an SEC. These were short -- so I don't know -- are those -- are we talking about those as incidents for the test sites, because the test sites are pretty unique in that -- in that respect.

MR. ELLIOTT: Talking about what as incidents? I just don't know what --

DR. MAKHIJANI: Internal exposures --

MR. ELLIOTT: Oh.

DR. MAKHIJANI: -- that were not -- because early on we said, you know, if there were 18,000 MAC that was monitored, then (unintelligible) planned activity, then it's not an incident. But if were not monitored, then it becomes an incident. So I think that monitoring -- I -- I just want to be clear whether monitoring is a factor in how an

incident is defined. That's where we kind of wound up in that example.

DR. NETON: I think an incident is an incident. If you have monitoring, you can do something about it, so...

DR. MELIUS: I don't think it would necessarily affect -- it could, but it wouldn't necessarily -- just because there was monitoring, would indicate that it's not an incident; it's still an incident.

DR. NETON: Right.

DR. MELIUS: I think there's sort of this intersection between sort of how we look at an incident and radiation -- failure of radiologic controls and being able to reconstruct dose. And -- and I don't know how to proceed on this 'cause, given the complexities of the site, is -- do we just take a few incidents and then try to figure out how that -- how to apply it in those incidents, sort of make this operational in, you know, three or four incidents? I don't know what the number is, but...

DR. ROESSLER: You know, beyond that -- I think beyond this particular site, my question would be on any site where does the list of potential

incidents come from? I mean there will be a list which are going to be evaluated and who or how is that list generated?

DR. MELIUS: Well --

MS. ROBERTSON-DEMERS: That's where the incident criteria comes into play.

DR. NETON: Well, the petitioner certainly has the -- in the beginning the petitioner can cite all the incidents they would like (unintelligible) --

DR. ROESSLER: But there may be potential --

DR. NETON: -- you know, we need to run them to ground, but we also take, you know, proactive approach and start to try to find evidence of any other incident (unintelligible) --

DR. ZIEMER: Is one of the characteristics of an incident the fact that it is not planned? I mean as an a priori part of the definition.

DR. NETON: I think we need to be careful there, though, because in my mind --

DR. ZIEMER: Well, I'm trying to distinguish between the planned events of testing weapons, for example, and even -- I guess you could even argue about planned releases such as those -- planned releases from Hanford, but what -- in

terms of when we say "incident" is -- are we inherently talking about something that occurs that's outside the planned parameter of the planned test or whatever it is?

DR. NETON: I don't think necessarily, because --

DR. WADE: But possibly.

DR. NETON: But in this case, Nevada Test Site -- I mean they planned to explode the weapon.

DR. ZIEMER: Right. No, I --

DR. NETON: But the incident we're looking at in this case, in my mind, is the internal exposures that were unmonitored. Right? I mean it was an unmonitored event that was planned, they just didn't have the -- I don't want to say foresight, but (unintelligible) --

UNIDENTIFIED: (Unintelligible)

DR. NETON: -- internal exposures were (unintelligible) --

DR. ZIEMER: They didn't know (unintelligible).

DR. NETON: -- so in that mind it kind of rises to the incident level because it was unforeseen exposure pathway that --

DR. ZIEMER: Uh-huh.

DR. NETON: -- wasn't documented or something.

DR. WADE: But as I understand the task -- I mean what you're trying to do is to determine if there are discrete incidents that will likely have exceptionally high exposures and on and on, so what the working group has said are -- these are things you might find present at those situations. They're not meant to be all-inclusive or all-exclusive. So now with this list, then what has to happen with this list is that someone -- SC&A, the working group, NIOSH, a combination -- needs to go through the evidence and see what they can pull out that sort of meets some of these criteria. Then you get this -- this list of things and then you need to start to do the hard analysis as to whether any of these rise to the bar that -- that will be defined.

Now who does it, as Gen asks, right now the working group chair is asking SC&A to begin the process. That's quite reasonable, but -- but not easy, because how -- how many data streams, how deep you mine the data to develop this candidate list is really an art at this point. And you know -- but you have to start it to see what happens.

DR. MELIUS: And what I would propose is that we take some sampling and bring it back for -- to the workgroup for discussion, and that way -- then maybe we come up with another set of criteria how we would apply -- you know, figure out what the incidents are and whether they -- incidents are important to us evalua-- relative to the SEC, 'cause there may be a whole host of incidents. I mean that's sort of what you were getting at, Paul, that -- that may be, you know, not SEC level 'cause we'll be able to reconstruct dose or whatever and -- 'cause -- 'cause of monitoring, so -- and that's also what I think you're getting at, so I -- I don't think we define an incident by whether it's monitored or not, but I think in terms of its relevance to a Special Exposure Cohort it is going to -- the fact of whether the explosions were monitored so -- or not, it's going to be -- will be important criteria.

DR. NETON: I guess doing -- doing this analysis -- in doing this analysis, I think it would be good if the emphasis was placed on, if possible, looking at the civilian population exposures. I know that's not always going to

be easy, but rather than -- you know, the bulk of the data are going to be military -- military personnel, but -- they are commingled, but they are identified in these exposure reports separately, to a large degree. So -- so that we -- we can compare apples and apples.

DR. MELIUS: Uh-huh.

DR. NETON: It'd be good to look at that.

DR. MELIUS: So -- so if the step was a sample of the incidents of, you know -- potential incidents at Nevada Test Site and then focus of not only on, you know, will they meet criteria and so forth, but then focus on trying to just pinpoint some that are relevant where there was a significant number of civilians there --

DR. NETON: Right.

DR. MELIUS: -- so we start to figure out how this is operationalized 'cause we -- I think we know that there's a problem with internal exposures.

DR. NETON: Some of the NTS specific case files have some interesting descriptions in them.

DR. MELIUS: Okay.

DR. NETON: Some of the so-called old-timers have written down some notes and pages on this.

They might be able to provide good access to...

DR. MAKHIJANI: And these are -- these are where?

DR. NETON: These would be in the case files. I know that's a sensitive issue these days, but I think we can work through that.

DR. WADE: And I think SC&A has access to the case files.

DR. MAKHIJANI: I -- I believe -- I haven't tried it, but I got that e-mail yesterday.

DR. NETON: But I would -- I would -- if you're going to, there's the 61 that have less than 250 days exposure that -- I've gone through a number of them and I've found some interesting anecdotal information from the CATI interviews or supplemental information. I mean some people took the time to write a two, three-page summary of -- of their activities, to the extent of, you know, after an operation they were -- there was a bulldozer running back and forth to bury the material -- that sort of thing, so I think there's some useful information in there that could (unintelligible) --

DR. MELIUS: And could we then use that as a

partial basis for choosing the -- you know, list the sample of incidents or whatever we're going to call that that we're going to be looking at. I just want everyone to understand that up front so that we're not --

DR. NETON: Yeah, I think that'll -- I don't know -- I'm not saying that they're -- all have (unintelligible) --

DR. MELIUS: Yeah -- no, no.

DR. NETON: -- but I've run across at least two or three in my casual --

DR. MELIUS: Uh-huh.

DR. NETON: -- trying to put together -- prepare for this meeting that there are some writeups in there that might be useful -- civilian experience.

DR. MAKHIJANI: Jim and maybe one or two other people at NIOSH might have this list, so if you could --

DR. NETON: I could (unintelligible).

DR. MAKHIJANI: -- make the list and provide it to us and save duplication work 'cause --

DR. NETON: Yeah.

DR. MAKHIJANI: -- I'm a little bit afraid of the schedule between now and December. I feel

the first piece of the charter would be very doable. The second piece --

DR. MELIUS: I'm not sure is -- I'm not sure is doable.

DR. MAKHIJANI: -- is very complicated and I'm not sure it is doable, but we -- especially if you want to see it before and if you want to be in decision-making mode, that may be a little (unintelligible) --

DR. ZIEMER: No, I think if you get the first piece by December that'll be fine.

DR. WADE: Clearly not, and this is terribly important, not only to Nevada Test Site but to other sites, so I think it's important that this be done carefully and done right.

DR. MAKHIJANI: Well, that's why I just -- it's my kind of gut reaction that if we try to rush this, we might --

DR. MELIUS: No, no.

DR. MAKHIJANI: -- wind up at a place that -- start arguing about it after the fact, which would not be so good.

DR. MELIUS: No, no, my -- what I would see is if we could have the criteria --

DR. MAKHIJANI: Right.

DR. MELIUS: -- present -- present our plan for going forward at the next -- next meeting and then be scheduling another workgroup meeting prior to the -- what do we have, a February meeting? -- prior to that to try to, you know, meet and accurately (unintelligible) --

DR. WADE: But I do think this criteria, one by the working group, refined and presented along with a plan, would be a tremendous accomplishment for December.

DR. MAKHIJANI: I think that -- Hans, do you think -- I think we can do the criteria.

DR. BEHLING: Are you looking at me to do it?

DR. MAKHIJANI: No, I'm not looking to you to do it, I'm looking -- I'm looking to you for an opinion of somebody who's experienced on our team. I'm not -- I'm not going to ask you to do it. I know you're a busy man.

DR. BEHLING: Well, I'll -- I'll help.

DR. MAKHIJANI: Okay.

DR. MELIUS: (Unintelligible) knows, I -- we haven't heard from John Mauro in two hours, (unintelligible) about work.

DR. MAKHIJANI: John, is that a fair commitment?

DR. MAURO: Could I -- before we go there, 'cause I'm trying to sort this out, the idea of incidents and defining them and finding them and -- but at the same time I'm looking at your draft report and I do now have the updated version --

DR. MAKHIJANI: Oh, great.

DR. MAURO: -- that you -- and I'm looking -- just for a moment, if you'd bear with me, could you -- could you folks go to page 13, table --

DR. ROESSLER: (Unintelligible)

DR. MAKHIJANI: Which one, the Nevada one?

DR. MAURO: This is the "Health Endangerment Assessment for the Nevada Test Site Special Exposure Cohort," this is not the criteria document. This is the Nevada Test Site document.

DR. WADE: Page 13, did you say, John?

DR. MAURO: Page 13, and it's cal-- and it's Table 3.

(Pause)

DR. MELIUS: Okay.

DR. MAURO: Okay. Now, what we have here is information that says that there were a number of individuals that experienced doses above

five rem. We know the categories -- Army, Navy -- and we know one category -- scientific personnel, contractors and affiliates. I assume that last column applies -- I'll ask you all -- applies to civilians. The question I have is, given these data -- you see, I'm trying to juxtapose incidents with records of information on magnitudes of exposures that have occurred. And let -- let's say we go through the process you have just described whereby we are able to define and list and describe a number of incidents that are -- the criteria for the incidents, what constitutes a trigger that -- all -- well, this might be something we need to look at. And I'm not sure what we do with this information -- for example, the Table 3 information -- that tells us well, yes, we do have some people that experienced doses that were above five rem and this -- for this -- we actually picked this case because apparently this is one where we felt the external exposures anyway were -- were high. How -- how do we combine this information now? I'm -- I guess I'm sort -- if we know we have an incident, but we have -- and

we -- but we don't know very much about the -- the magnitude of the exposures that might or might not have occurred or be associated with that incident, does that get us where we need to go or are we just -- be -- would it be just good enough to know that well, we can get a handle on -- that yes, there were incidents, but we -- but we really can't say much about the magnitude of the exposures?

See, I -- I -- what I'm saying is I think we could do what you're asking in terms of identifying all the different categories of incidents that might have occurred in the records. I'm not quite sure what we do with that information once we have it.

DR. NETON: Well, you have these incident and criteria that were developed to bounce against. Right? I mean that was the idea.

DR. MELIUS: So you --

DR. MAURO: Let -- let's say we have that and we --

DR. MELIUS: -- you have that --

DR. MAURO: -- and we do say yes, there were -- these many incidents occurred over this time period at this facility. Let's say we're

talking Nevada Test Site, whatever criteria we come up with. When we have that, we have a piece of the -- I guess -- a piece -- one of the criteria is yes, we do have incidents. Are we going to do -- would -- what -- and I think that -- that's doable and, as you had mentioned, depending on how rigorous and how complete you'd like it will determine the level of effort, the time it might take. And as Kathy pointed out, we of course have to struggle with the issue of what the def-- you know, the -- of the -- I guess the variable nature of what -- what the definition of an incident is, according to the different record-keeping practices. But let -- let's assume we go through that process. I guess I'm looking forward, beyond that a little bit, and say the -- you know, once we have that information, is that going to put us into a position that will get us to where we are going to be able to come to grips with -- unless we could do something about dose, I guess that's where I'm getting with -- associated with these incidents, or somehow place -- place some kind of order of magnitude exposure, you know, on what the doses

might have been to people who were involved in those incidents. Is that where we're headed in the next step after we get our hands around the definition and what incidents have occurred?

DR. MELIUS: I think the next step is we want some description of who was at that incident and what the -- what -- what their nature of their work was at the site and parameters like that. So that would be -- kind of information would be used to -- to -- you know, potentially to establish a class.

DR. MAURO: Notwithstanding what the doses might or might not have been.

DR. WADE: Well, if the working group feels, based upon its criteria, that an incident occurred that meets the intent of the law, then the next step would be to attempt to define a class --

DR. MELIUS: Right, but -- but --

DR. WADE: -- surrounding that --

DR. ZIEMER: An incident for which we cannot reconstruct doses.

DR. MELIUS: Right, yeah. But -- but fir-- first we want you do is to -- take a sample of the, you know, possible incidents that -- at

Nevada Site, how -- how would we apply the criteria to those. And then secondly, among those -- for -- for those, what are the -- you know, give us some information on who was present and the nature of their -- their work, durations, things like that that I think -- as Jim was pointing out -- are, you know, based on some of the documentation about the tests and so forth. And then let us come -- then let us go back and talk about it and it may be that then -- then there's -- I don't think we want to just select out those that qualify for the class or whatever at this point in time. I think we need to sort of figure out first one -- one can -- do we have criteria that we -- are useful for classifying incidents, and then secondly, how are we then going to work on defining the class. And we need to understand that information a little bit better in terms of what approaches might be used for defining it -- you know, appropriately defining a class.

DR. MAURO: Okay.

DR. ZIEMER: Comment.

DR. MELIUS: Yeah, Paul.

DR. ZIEMER: And I know this has taken a little

bit different direction maybe than you expected, Arjun, but --

DR. MAKHIJANI: (Unintelligible) these were (unintelligible) pieces.

DR. ZIEMER: -- I just wanted to say to you and to SC&A that I found the document very helpful in thinking about this whole problem, so I appreciate the work that's gone into -- well, actually both the documents, and they do help us think about the parameters and try to come to grips with the issue, so --

DR. MAKHIJANI: Yeah. No, I have no -- no investment (unintelligible) --

DR. ZIEMER: No, I understand that, but --

DR. MAKHIJANI: -- any of the (unintelligible).

DR. ZIEMER: -- I did want -- I did want you to understand that it's -- it's been helpful.

DR. MAKHIJANI: I appreciate that.

DR. ZIEMER: A helpful document.

DR. ROESSLER: Jim, you mentioned that -- okay, the workgroup is going to present this plan at the December Board meeting and that you hope the workgroup could get together before the February meeting. I suggest that we -- while we're all here, pick a date if we're going to

do that.

DR. MELIUS: Okay.

DR. ROESSLER: We have a January 11th conference call and the February meeting is the 7th through the 9th.

DR. ZIEMER: At the December meeting the subcommittee will probably meet at what, 11:00 o'clock, Lew?

DR. WADE: 11:00 o'clock. The morning of Monday will be available for workgroup meeting time.

DR. MAURO: I've got a question regarding this mission. Are we going to be focusing in on I guess the Nevada Test Site and the definition of incidents and classes within the context of the Nevada Test Site, or are we talking a little more broadly than that?

DR. MELIUS: Nevada Test Site.

DR. MAURO: Okay. Thank you.

MS. MUNN: Jim, may I make a comment?

DR. MELIUS: Yes, you may, Wanda.

MS. MUNN: It occurs to me that since there's so much focus on the Nevada Test Site, it would be very helpful for the workgroup which has that responsibility for NTS to be brought up to

date on what's transpiring here --

DR. MELIUS: Yeah.

MS. MUNN: -- and to have access to these documents. It would be -- I think there's so much cross-fertilization here that to have one group working on one segment of the issue and another workgroup working on another segment, without clear cross lines of communication, may confuse us all and cause more of a time delay in coming to fruition than we really want.

DR. MELIUS: That's a -- I agree.

DR. MAURO: It's interesting to know, by the way, that when talking about the Nevada Test Site site profile, in general -- and correct me if I'm wrong -- those documents usually are concerned with the chronic exposures people routinely experienced as part of their work, and incidents are not usually part of that. And in fact, that was very often one of our comments. So I certainly agree that marrying the knowledge base that the Nevada Test Site folks have, but I think that we're probably going into an area that is not the primary focus of what we've been doing at Nevada Test Site -- and Arjun, please correct me if I'm

wrong.

DR. MAKHIJANI: Well, but I think -- I think that simply adding -- adding that working group to -- to the document, forwarding this, it would be a good thing.

DR. MAURO: Yeah. From a practical standpoint, Arjun, when I read your report -- the version everyone has -- it looks like you've got a good start. That is, those -- very -- you have described. In effect, in the process of trying to characterize the magnitude of the exposures that are on the record that individuals have experienced that were above one rem and then you've binned them -- you know, from one to I guess three, above five, and so forth. In the process of doing that, apparently you have uncovered records that you would attribute these exposures to what would be called an incident. Now from my -- for the ben-- from the practical standpoint, do you see this as tractable? That is, Kathy DeMers, you -- you -- you helped Arjun build these tables and these documents, as I understand, came out of incident reports or -- is that correct?

DR. MELIUS: John, can we -- we need to sort of

pick some dates here and --
DR. MAKHIJANI: Let's talk about that off -- off --
DR. MELIUS: Off-line, yeah.
DR. MAURO: Okay.
DR. MELIUS: Were you -- somebody was prop-- I thought proposing that we try to meet just before the December meeting?
DR. ROESSLER: Oh, no, I wasn't suggesting that.
DR. ZIEMER: I was just pointing out that there is a possibility.
DR. MELIUS: Oh, okay.
DR. WADE: If you wanted to meet with the Nevada Test Site site profile workgroup, you could do it that Monday morning.
DR. ROESSLER: Oh, oh, oh, oh --
DR. MELIUS: I -- I see, I -- I don't think that --
DR. ROESSLER: -- maybe that's not enough time for --
DR. MELIUS: I don't think that -- no.
DR. ROESSLER: -- all these things to --
DR. MELIUS: Yeah, right.
DR. ROESSLER: -- develop.

DR. WADE: So then we go into January.
DR. MELIUS: Yeah, and I think -- I want to give you enough time.
DR. MAKHIJANI: Yeah, so -- like the work-- at the Board meeting, you -- you're expecting one document, which is the criteria document.
DR. MELIUS: Right.
DR. MAKHIJANI: And then at the working -- prior to the working group meeting, you will expect the next document, which will relate to incidents at Nevada Test Site.
DR. MELIUS: Correct.
DR. MAKHIJANI: Okay.
DR. MELIUS: And -- and so I'm thinking that's something that -- that meeting should be toward the end of January? Since we're meeting the 7th, 8th and 9th is the February meeting.
DR. ROESSLER: There's a mid-year health physics meeting from about the 20th of January to about the 25th and I'm -- I'm certainly going to be there. I don't know how many other people would be.
DR. MELIUS: Minneapolis?
DR. ROESSLER: Knoxville.
DR. MAKHIJANI: Could be at the end of the week

before that.

DR. MELIUS: Yeah. Around the 19th?

DR. WADE: Sure.

DR. MELIUS: Or --

DR. ROESSLER: Let's give a few days in between, like maybe the 15th?

DR. WADE: 17th?

DR. ROESSLER: 17? Yeah, 17th would be good.

DR. WADE: Okay.

DR. MELIUS: Actually the beginning of that week's better for me.

DR. ROESSLER: I like it better, too.

DR. WADE: 16th? 15th is a government holiday -- 16th?

DR. MELIUS: 16th?

DR. ROESSLER: Sounds good to me.

DR. WADE: Face-to-face or telephone?

DR. MELIUS: What do people think?

DR. ROESSLER: I think face-to-face is better.

DR. MELIUS: Face-to-face might be better, simply because it's a lot of paperwork. Okay.

DR. WADE: So working group meeting --

DR. MELIUS: 16th.

DR. WADE: -- Cincinnati?

DR. MELIUS: Cincinnati on the 16th.

DR. WADE: You want to start at 10:00, give people the opportunity to fly in, or...
DR. MELIUS: How do people feel, do they -- the night before works best for me.
DR. ROESSLER: Start at 8:00 and see if we can get done --
DR. MELIUS: Yeah, getting out earlier.
DR. MAKHIJANI: From that point of view, could we do it on the 17th so we don't have to be flying out on a holiday, 'cause the -- the airline things may get kind of crazy on holidays in terms of just getting reservations and --
DR. WADE: (Unintelligible) proposal for the 17th?
DR. NETON: I think that is somehow (unintelligible) school breaks or something like that. Last year had a problem.
DR. BEHLING: It's always a problem (unintelligible) it's a combination with a weekend.
DR. WADE: Is that okay with you, Dr. Melius?
DR. MELIUS: I'm going to need to check on (unintelligible) --
DR. MAKHIJANI: We can do it on the 16th,

that's fine. I'm open on the 16th. That's fine. I was just suggesting --

DR. ROESSLER: Either one is fine.

DR. WADE: We could also do it the afternoon of the 16th so people could travel in the morning.

DR. MELIUS: Yeah, that's fine.

DR. WADE: You don't want to cut into people's holiday, which --

DR. MAKHIJANI: I like both days --

DR. ROESSLER: Keep both days...

DR. MELIUS: Yeah, okay -- yeah, I'll figure out -- I've got a conflict on the 17th, but I can check and find out.

DR. WADE: Here in Cincinnati.

DR. ROESSLER: At the airport.

DR. WADE: Maybe this (unintelligible).

THE COURT REPORTER: On the 17th then?

DR. ROESSLER: He's waiting --

DR. WADE: Either the 16th or 17th -- afternoon of the 16th or the morning of the 17th.

DR. MELIUS: Okay. Any other comments or questions?

DR. WADE: I compliment the workgroup on taking on such a knotty issue. I think it's an issue that needs to be addressed and I applaud the

approach.

DR. MELIUS: Good, and I would like to thank the -- SC&A and also NIOSH. Larry -- I guess Larry left, but Jim, thank you. It was helpful and it --

DR. WADE: And it's always good to have Jim Neton at the table.

DR. ZIEMER: You bet.

DR. MELIUS: Yeah.

MS. MUNN: It is indeed.

DR. MAKHIJANI: And Jim, can I thank our young people who helped here --

DR. MELIUS: Yeah.

DR. MAKHIJANI: -- Bob Barton and Kathy DeMers really put in a lot of work.

DR. WADE: Okay. Well, we are then adjourned.

(Whereupon, the meeting concluded at 11:34 a.m.)

CERTIFICATE OF COURT REPORTER

STATE OF GEORGIA

COUNTY OF FULTON

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of November 17, 2006; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 24th day of November, 2006.

_____

STEVEN RAY GREEN, CCR

CERTIFIED MERIT COURT REPORTER

CERTIFICATE NUMBER: A-2102