**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**

**ROCKY FLATS**

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held in Hebron, Kentucky on March 28, 2006.

# C O N T E N T S

March 28, 2006


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**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.

# P A R T I C I P A N T S

(By Group, in Alphabetical Order)

BOARD MEMBERS

EXECUTIVE SECRETARY
WADE, Lewis, Ph.D.
Senior Science Advisor
National Institute for Occupational Safety and Health
Centers for Disease Control and Prevention
Washington, DC

MEMBERSHIP

GIBSON, Michael H.
President
Paper, Allied-Industrial, Chemical, and Energy Union
Local 5-4200
Miamisburg, Ohio

GRIFFON, Mark A.
President
Creative Pollution Solutions, Inc.
Salem, New Hampshire

MUNN, Wanda I.
Senior Nuclear Engineer (Retired)
Richland, Washington

PRESLEY, Robert W.
Special Projects Engineer
BWXT Y12 National Security Complex
Clinton, Tennessee

IDENTIFIED PARTICIPANTS

ALLEN, DAVE, NIOSH
BARRIE, TERRIE, ANWAG
ELLIOTT, LARRY, NIOSH
FALK, ROGER, ORAU
FITZGERALD, JOE, SC&A
GLOVER, SAM, NIOSH
HARDEN, JERRY
HOWELL, EMILY, HHS
JESSEN, KARIN, ORAUT
KATZ, TED, NIOSH
KOTSCH, JEFF, DOL
LANGSTED, JIM, ORAU
LITTLE, CRAIG, ORAU
MAKHIJANI, ARJUN, SC&A
MAURO, JOHN, SC&A
MEYER, BOB, ORAU
NETON, JIM, NIOSH
REID, STEVE, ORAU
ROBINSON, AL, ORAU
SMITH, MATTHEW, ORAU
SUNDIN, DAVE, NIOSH
THOMPSON, JENNIFER, PETITIONER
ULSH, BRANT, NIOSH

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

(10:10 a.m.)

(Note from the Court Reporter: The following transcript contains a great number of "unintelligible" messages. Unfortunately transcription was often rendered impossible due to faulty audio-visual equipment of the meeting facility and poor telephonic connections. Please know these gaps in transcription are not the fault of the court reporter and not the fault of the speakers.)

**WELCOME AND OPENING COMMENTS**

**DR. LEWIS WADE, DFO**

**DR. WADE:** This is Lew Wade. I'd like to welcome the working group, the meeting of the working group. This is the working group that deals with issues related to site profiles, reviews of individual dose reconstructions and reviews of procedures. The group is ably chaired by Mark Griffon and consists of Mike Gibson, Bob Presley and Wanda Munn. All of those individuals are with us either by phone or around the table in Cincinnati. Let me sort of briefly set the table for what we're doing and what will follow based upon what we're

doing. The Board has responsibility, statutory responsibility to review individual dose reconstructions. To assist them with that responsibility the Board has taken on the -- the task of reviewing site profiles which are documents that dose reconstructions can be based upon. The Board has been involved in a review of the Rocky Flats site profile for some time now. The Board has used its contractor, Sanford Cohen and Associates, to assist in the review of that site profile. Recently with the awareness that there was an SEC petition pending on Rocky Flats, this working group and the Board has asked that the focus of the site profile really for the time being be on issues that are related to the SEC petition; but again we're still looking at the subcommittee and its work of reviewing site profiles. Once this meeting is over some things will happen. NIOSH intends to release its petition evaluation report on the Rocky Flats SEC petition in the first week of April. This working group will reconvene on the morning of April 12th and will take on the responsibilities of the SEC petition. Again much of what we -- we talk

about here today will inform and guide those discussions but when this group meets again on the 12th, its focus will be particularly on the SEC petition and the petition evaluation report. It is anticipated that the Board will debate during its April 25th, 26th and 27th meeting, full Board meeting, the Rocky Flats SEC petition and come to some recommendation on that petition. So that's what we're doing here, looking at technical issues in the site profile with a particular eye towards the SEC petition. And then on the 12th we'll be focused particularly on the SEC petition. Well, I'd like to do a couple of things now. I'd like to go around and introduce the people who are here around the table. I'd like to introduce people on the phone starting with representatives of the NIOSH or ORAU teams, the SC&A teams, obviously the Board members present, other federal employees that are present on the call, anyone directly involved in Rocky Flats; petitioners, members of Congress or representatives of those members who have an interest; and then anyone else who would like to be identified. Then we'll have a

bit of a conflict of interest discussion where I'll talk a little bit about the Board and its members relative to Rocky Flats. I would ask the leader of the NIOSH delegation to identify his team including identifying any conflicts that exist. I would ask the leader of the SC&A to do the same thing. And then I'll turn it over to Mark and Wanda to begin the deliberations. So with that as an action plan we'll start around this table. Again, my name is Lew Wade. I work for NIOSH and have the privilege of serving as the Designated Federal Official for the Advisory Board.

**MR. LITTLE:** My name is Craig Little. I'm with the ORAU team.

**MR. FALK:** And my name is Roger Falk. I'm with the ORAU team.

**MR. LANGSTED:** Jim Langsted with the ORAU team.

**MR. MEYER:** Bob Meyer with the ORAU team.

**DR. ULSH:** I'm Brant Ulsh with NIOSH.

**DR. NETON:** Jim Neton with NIOSH.

**MR. ALLEN:** Dave Allen with NIOSH.

**DR. GLOVER:** Sam Glover with NIOSH.

**DR. MAKHIJANI:** Arjun Makhijani with SC&A.

**MR. FITZGERALD:** Joe Fitzgerald with SC&A.

**MR. PRESLEY:** Robert Presley with the Board.

**MS. HOWELL:** Emily Howell, HHS.

**MS. MUNN:** Wanda Munn with the Board.

**DR. MAURO:** John Mauro with SC&A.

**MR. ELLIOTT:** Larry Elliott, NIOSH.

**DR. WADE:** Now, before I turn to have members on the phone identify themselves, one note from Ray. If at all possible, please try and use the handset on your phone and not a speaker phone. It works much better for us here. If anyone has any problems hearing or being heard we'll yell at you, you yell at us. We want to make use of all the talent that's here and on the line. Let's start with members of the Board who are on the call.

**MR. GRIFFON:** Mark Griffon.

**MR. GIBSON:** Mike Gibson.

**DR. WADE:** Thank you. Members of the NIOSH and ORAU team who are on the phone.

**MS. JESSEN:** Karin Jessen, ORAU team.

**UNIDENTIFIED:** Kay (unintelligible), ORAU team.

**UNIDENTIFIED:** (Unintelligible), ORAU team.

**DR. WADE:** That last gentleman needs to speak louder and more clearly.

**UNIDENTIFIED:** (Unintelligible), ORAU team.

**MR. ROBINSON:** Al Robinson, ORAU team.

**MR. SMITH:** (Unintelligible) Smith, ORAU team.

**MR. REID:** Steve Reid, ORAU team.

**DR. WADE:** Anyone from NIOSH on the call?

**MR. SUNDIN:** This is Dave Sundin, NIOSH.

**MR. KATZ:** Ted Katz, NIOSH.

**DR. WADE:** SC&A team?

**UNIDENTIFIED:** (Unintelligible)

**DR. WADE:** Could you speak more clearly, please?

**UNIDENTIFIED:** Joan (unintelligible).

**DR. WADE:** Okay. Anyone else?

(No response)

**DR. WADE:** Okay. How about Rocky Flats petitioners or interested parties?

**MS. BARRIE:** This is Terri Barrie with ANWAG.

**DR. WADE:** Anyone else representing or of the Rocky Flats community?

(No response)

**DR. WADE:** Other federal employees?

**MR. KOTSCH:** Jeff Kotsch, Department of Labor.

**DR. WADE:** Is there anyone else on the call who would like to be identified?

(No response)

**DR. WADE:** Okay. Let’s have a bit of a

conflict of interest discussion in three parts. As it turns out there are no Board members on this working group who are conflicted on Rocky Flats and therefore there are no prohibitions to the full participation of any of the working group members either in the discussion on site profile or SEC petition. Now, I would ask the leader of the NIOSH ORAU team to identify members and potential conflicts.

**DR. ULSH:** I'll handle that, Lew. With regard to the ORAU team members present here in the room we've got Jim Langsted and Roger Falk, both of whom have long working histories at Rocky Flats. They're here in the capacity of subject matter experts. I am heading up the team that's evaluating the SEC petition that was submitted and Karin Jessen is on the phone. She is heading up the response to the -- she's preparing our evaluation report. There's no conflict there. I think it's just Jim and Roger, and so they are here in the capacity of subject matter experts.

**DR. WADE:** Okay. SC&A?

**DR. MAURO:** Participants here today are myself, John Mauro, Joe Fitzgerald, Arjun Makhijani and

Dunstana Melo. None of us have a conflict; however I would like to ask Joe to just summarize briefly his role, one, with DOE, and his relationship in that role regarding Rocky Flats.

**MR. FITZGERALD:** Yeah. First off, I worked for the Department of Energy from 1980 to 2001, headed the Health and Safety office of DOE headquarters from ’91 to 2001, and was basically responsible for all the policies and regulations on radiation protection for the Department of Energy for that time span. But certainly nothing that would be linked to the operations of the Rad program at Rocky or any of the actual procedures or policies implemented at the site. So I don’t -- certainly don’t see a conflict of interest.

**DR. WADE:** Okay. I think that brings us to starting the deliberations of the meeting. I will point out that this is a public meeting but we’ve allowed no opportunity for public comment. We have, as is our process, allowed petitioners to -- to make comment as they feel is appropriate and ask questions and make contribution. So any of the petitioners or

their representatives, you're allowed to fully participate and that's encouraged. Wanda or Mark, please?

**MR. GRIFFON:** Yeah. I think, Wanda, we're just going to stay with the matrix so -- the matrix that we had worked from, dated February 27th, 2006. And I think if it makes sense we'll just do like we did with Y-12, go down the action items and work from there. Is that okay, Brant?

**DR. ULSH:** Sure.

**TIB 49**

**MR. GRIFFON:** Okay. So the first one is actually probably the most lengthy discussion that we'll get into. Item 1A is the TIB 49.

**DR. ULSH:** We're in the process of --

**MR. GRIFFON:** I think you've -- you've provided quite a bit of information on this so I'll let you take it over, Brant.

**DR. ULSH:** We're in the process of getting the handout going around the table here, Mark. Just give us a couple of minutes. And actually as you mentioned, TIB 49, a draft of it has been delivered to SC&A along with a lot of supporting material. Jim Neton has been

heavily involved with this, and I think he's going to head up the discussion on our approach for super S.

**MR. GRIFFON:** Now, what you're handing out can you -- do I have that? Do we have that?

**DR. NETON:** You should have, Mark. That's titled, "An Approach to Dose Reconstruction for Super Type S Material," dated March 21st, 2006.

**MS. MUNN:** Jim sent it out by email.

**DR. NETON:** It went out a few days ago.

**MR. GRIFFON:** Okay.

**DR. NETON:** So I'll be speaking from two documents. One is the draft OTIB 49, a document that was sent out awhile ago; I've forgotten what time. It's also on the O drive. And also what I would call a supplement to OTIB 49 which is titled, "The Approach to Dose Reconstruction for Super Type S Material." I think I'm just going to summarize where we're at with this and just I've got a couple control dosimetry experts from NIOSH with me to back me up on some of these analyses. And I'll just open the floor for discussion. OTIB 49 if you looked at it is our approach to correcting for the differential solubility of varying

solubles, so-called super type S material versus what would be normally the ICRP default of a soluble material called type S. It's recognized in several places, Rocky Flats among them, that there are forms of plutonium that just do not behave like type S material. That is they -- they leave the lungs much more slowly than one would expect. To look at this, the difference in the lung dose per -- on a per unit intake basis -- that is if I inhaled the same amount of type S material and the same amount of type super S material, what would be the difference in -- in lung dose over time? We put a team of experts together to evaluate a number of cases. In TIB 49 there were ten design cases that were evaluated. Nine of those cases were specific to Rocky Flats and there was one case that was well documented exposure at the Hanford facility. When one looked at the retention of plutonium in the lungs of those ten design cases, two stood out as having very similar clearances and very -- and also exhibited the longest retention times of any of the ten cases. The two cases are Rocky Flats 872 and the so-called Hanford 1

case. In the TIB 49 document one looks at the clearance of those two cases overlapped on the graph. They're -- They're virtually identical with some exceptions in the very early time periods. The decision was made by the expert team to use those two cases as bounding analyses, that is the most insoluble materials to calculate the difference in the lung dose over time. So an analysis was done using our IMBA software where the case was evaluated using the available lung monitoring data and the available urinalysis data to fit a retention code. Based on those retention codes one can calculate then the estimated difference in the dose between how the retention in the lungs would behave for super S versus S and in the analysis since HAN 1 and Rocky Flats 872 are so close, they chose to create an adjustment factor per year based on the case that exhibited the highest difference between super S and -- and S. So that's the basis of TIB 49, so it really is a look-up table document that -- that one would, if I knew the intake of type S -- if I knew the intake of material, how much more dose would I have to

assign to a person because of the lengthy clearance of super S from the lungs. That takes care of one issue we think. That issue is how are the lung doses determined.

**MR. GRIFFON:** I was curious about you said you -- you had ten design cases?

**DR. NETON:** Uh-huh.

**MR. GRIFFON:** What was the universe of cases, or was that the universe of cases? I don't understand how you -- how you got to these cases. Some of them were known from a plutonium fire; is that correct? Or --

**DR. NETON:** Right. I think Roger Falk, who is sitting here, was one of the experts that participated in -- in this analysis and I -- I can -- the experts are listed on the document. They're Tom LaBone, Roger Falk, and Don Bihl. Since Roger's here maybe he could comment on the selection process.

**MS. MUNN:** Roger, turn that mike around.

**MR. FALK:** The cases were chosen based on being clean cases. That means that they had no significant previous exposures to the -- to the one major exposure that gave them a very high lung dose or a very high lung deposition. We

had six of those cases and they also participated in the medical monitoring program that we conducted from 1993 to -- to -- to the year 2003, which meant that we had modern lung count and urine data for these cases at about 35 to 40 years after the intake. So we had a very good measurement of both their early lung deposition starting in 1965 as well as recent measurements with the state of the art techniques in the -- in -- in the 1990s and into the -- into the year 2000s. So we had both the early data and the long-term data for these. These were also very high lung deposition cases; therefore there was no -- there was no -- there was no issue about being down in the mud. They were very clean cases. And we had six of those from the 1969 plutonium fire. We had one case from the 1969 plutonium fire that was -- that was in building 76 and 77. We had one case from a -- from a plutonium fire in a building 71 lab which was a very high case and we also added one case that was not exposed to high fired -- that was not exposed to a plutonium fire but was -- but was also -- but was exposed to a naturally oxidized

plutonium that was a glove failure. And then we have the Hanford 1 case which was a very well-documented case up at Hanford.

**MR. GRIFFON:** And can you -- the 872 case, the bounding case, was that from one of the fires or was --

**MR. FALK:** Yes.

**MR. GRIFFON:** And how many of these cases involved --

**MR. FALK:** That was from the 1969 plutonium fire.

**MR. GRIFFON:** And how many of -- of these cases involved chelation treatment or were these I guess most of them should be bounding cases used on chelation?

**MR. FALK:** Three of the cases for the 1969 plutonium fire were not chelated. All of the other cases were.

**MR. GRIFFON:** Okay. And 872?

**MR. FALK:** 872 was a chelated case.

**MR. GRIFFON:** All right. Thank you. I just wanted to get the parameters there.

**MR. FALK:** We're -- We're fairly comfortable that the chelation is not affecting the overall model -- the calculations. Chelation for these

super insoluble materials is -- is largely ineffective.

**MS. MUNN:** Doesn't appear to do anything.

**MR. FALK:** And you can only chelate systemically available material anyways.

**MR. GRIFFON:** All right. Thank you.

**UNIDENTIFIED:** Excuse me. (Unintelligible). I'd like to ask a question.

**MR. FALK:** Sure.

**MS. MELO:** I'd like to know why (unintelligible).

**MR. GRIFFON:** Jim, can you paraphrase that question? I couldn't hear her.

**DR. NETON:** I had trouble myself, Mark.

**MR. GRIFFON:** Okay.

**DR. NETON:** I think the question was why we didn't use a USTUR case and what number was that?

**UNIDENTIFIED:** It was 259.

**DR. NETON:** 259?

**MS. MELO**: 259, yes.

**DR. NETON**: Okay. And -- And our understanding is that that would have been a plutonium 238 case, not plutonium 239.

**MS. MELO:** (Unintelligible).

**DR. GLOVER:** May I address the case briefly? I'm a -- I was a radium chemist with the U.S. Transuranium and Uranium Registries. The case was a ceramicized uranium 238 material that had differential solubilities of function of time because a Pu-238 has such a high specific activity that it degrades the material. We are talking about plutonium material that doesn't have that much -- the specific activity is much lower and it's not going to exhibit this differential degradation because of that. And so we specifically excluded plutonium 238 from this TIB evaluation. That is not part of this.

**DR. MAURO:** For my edification I was aware that there was this distinction because of specific activity related to 238 versus 239. And you had just mentioned the reason has to do with the higher specific activity; but the 238 causes it to behave physically and chemically differently so you refer to degradation. Wouldn't that accelerate?

**DR. GLOVER:** It accelerates the -- the -- the solubility.

**DR. MAURO:** The clearance. But what I heard was the opposite though. What I just heard was

that it was -- it was cleared more slowly. I guess I was wondering -- there was a question --

**MS. MELO:** (Unintelligible).

**DR. GLOVER:** In the first -- the very beginning it starts out as ceramicized material and then quickly begins to degrade.

**DR. MAURO:** Okay.

**DR. GLOVER:** So the long-term differentials that we're talking about don't exist.

**DR. MAURO:** Got you.

**DR. GLOVER:** So they will become more solublized as you break the -- the chemical structure down, the crystal lattice, it becomes chemically available.

**DR. MAURO:** So if you get in the earlier time periods it moves more slowly but as it degrades it'll clear more quickly?

**DR. GLOVER:** And that happens fairly quickly.

**DR. MAURO:** Okay. I got it.

**MR. FALK:** And by quickly what -- what are we --

**DR. GLOVER:** I'd have to --

**MR. FALK:** Yeah.

**DR. GLOVER:** It's been awhile since I've looked

at that case. I do have the design parameters for that case.

**DR. MAURO:** I have a sort of a common sense question. In the cases that you ran, the -- the slower clearance rates associated with the cases you picked, what -- what -- how did that -- what is the biological half-life for I guess the long-term component for S versus the longest-term component for the super S that you looked at? In other words, how much of a difference was the clearance rate for the -- the long-term compartment for the lung for the case that you're using as your -- your representative case?

**MR. FALK:** I did not calculate that specifically but -- but the main -- the main clearance factor is in what the -- what the lung model calls the AI3 compartment clearing either to the BB1 which is the small bronchials or to the -- or to the lymph nodes. We used as the tenth minus six per day. One could -- One could also use the value of the tenth minus fifth but it basically -- but it basically keeps the material into the AI region which is actually claimant favorable relative to -- to -

- relative to having it go to the lymph nodes or -- or than to be cleared.

**DR. MAURO:** The -- In effect a tenth minus six per day for that compartment, for all intents and purposes it's -- it's not leaving.

**MR. FALK:** That is right.

**DR. MAURO:** So if -- if you were to run this very same calculation saying that it doesn't leave for the purpose of doing lung dose, lung dose --

**MR. FALK:** Yes.

**DR. MAURO:** You'd probably come up with the same dose. In other words, I understand why you would go to look into the Transuranic Registry to try to come up with relationships between lung counts I guess and clearance rates. But I'm looking at it from a very simple point of view. If we simply say to stop with the point of the view of the lung dose now, it never leaves.

**MR. FALK:** Once you get past maybe -- once you get past maybe 1,000 days or so, which is about -- which is about three years or so it -- it probably doesn't clear to any noticeable extent.

**DR. MAURO:** Now -- Now, the fraction that's assumed to be in the slow component, is that also changed? In other words, I'm thinking (unintelligible) quite frankly my familiarity of the lung dynamics goes back a little ways. And I think in terms of the fraction of those to the deep lung and then its retention and in terms of the high fired plutonium is the fraction that's assumed to go to deep lung a larger fraction so there -- so there really are two things going on? One, what's inhaled, more of it is going to the deep lung and that portion that is going to the deep lung is moving a lot more slowly. Would that be a -- I guess I would like to get a feeling between how different that is from the classic, let's say type S approach.

**MR. FALK:** The -- The -- The values for the ten cases were actually variable but it turns out that -- that both the HAN 1 and the -- in Rocky Flats 872 had a similarly fairly high fraction which was actually retained in a long-term manner. But that is a -- but that -- but that does vary from the case to case.

**DR. NETON:** I think -- excuse me, but I think

John was asking is -- is -- are the deposition parameters different and they are.

**DR. MAURO:** Yes. They --

**DR. NETON:** The initial deposition in the compartments of the lungs is the same.

**DR. MAURO:** Okay.

**DR. NETON:** You're not changing aerodynamic properties of the materials.

**DR. MAURO:** Okay.

**DR. NETON:** And that's pretty much based on where they deposit in the various regions.

**DR. MAURO:** Except if you change the particle sizes to reflect.

**DR. NETON:** Yeah.

**DR. MAURO:** And you looked at that, too.

**DR. NETON:** Right. Yes.

**DR. MAURO**: Yes.

**DR. NETON**: But -- But what does change is your -- it says here chemical solubility and/or your mechanical clearance properties. Now, it turns out in developing these models you couldn't shut down the clearance enough. If you shut down the clearance to almost nothing your mechanical -- your chemical clearance, your mechanical clearance was still clearing it

much too quickly based on -- based on the super S -- the type S model. So in essence they had to close down some of the clearance properties as well, mechanical clearance properties. There are a couple things going on.

**DR. MAURO**: Right.

**DR. NETON**: And no one really quite understands this but for large doses people speculate that there is actually tissue damage, fibrotic lesions that --

**MS. MUNN**: Must be.

**DR. NETON**: -- but no one really knows because you can only see and measure these effects in large inhalation cases. If -- If they're small you wouldn't see them necessarily and then, you know, you wouldn't know.

**MR. GRIFFON:** Okay. Any further discussion on the issues? I'm a little bit concerned -- this -- this ceramic materials -- first of all I've heard the statement that there was a lot of plutonium 238 at Rocky Flats. Is that --

**MR. FALK**: No.

**DR. NETON**: I didn't think that was an issue.

**MR. FALK**: There was a trace amount in weapons grade on the order of maybe 200 parts per

million. It wasn't a very significant component.

**DR. NETON**: So it seems to me a design case would be based on plutonium 239 because of this differential solubility issue and the ceramicized oxide. I'm not sure where this case is from, what site. Dunstana, do you know which facility the USTUR 259 came from?

**MS. MELO:** What?

**DR. NETON**: Do you know which DOE facility the case that you spoke of --

**MS. MELO:** Los Alamos.

**DR. NETON:** Los Alamos?

**MS. MELO:** Los Alamos.

**DR. NETON:** Right.

**DR. MAKHIJANI:** Roger, this is Arjun. Weren't there plutonium 238 RTG's made at Rocky Flats?

**MR. FALK:** What type?

**DR. MAKHIJANI**: RTG's.

**UNIDENTIFIED:** RTG's.

**MS. MUNN:** RTG's.

**DR. MAKHIJANI:** Did Rocky Flats manufacture RTG's?

**UNIDENTIFIED:** Thermal generators.

**DR. MAKHIJANI:** Thermo-electric radio-isotope

(unintelligible).

**MR. FALK:** I am not aware of that.

**MS. MUNN:** I thought it was all Los Alamos and Hanford.

**DR. MAKHIJANI:** So I guess --

**UNIDENTIFIED:** Hello?

**MR. GRIFFON:** (Unintelligible) manufactured the heat source for that.

**DR. NETON:** Right.

**MS. MUNN:** Uh-huh. Yeah.

**DR. NETON:** So it seems to me that the issue with USTUR 259 has to deal with two things. One is it was plutonium 238 which does not appear to be in -- present in significant quantities at Rocky Flats. And secondly I think the ceramicized matrix issue is something special possibly for Los Alamos. And I think we're fairly comfortable using Rocky Flats cases to do Rocky Flats calculations as well. So okay.

**DR. MAKHIJANI:** Before we leave that, I have -- I have a document here, a Rocky Flats (unintelligible) from the 1990s that talk about (unintelligible). And 107 items, 12 of which are americium 241, 38, plutonium 239, 57,

plutonium 238. They also have a (unintelligible) 90. Now, they may have come from outside, obviously, sources. It doesn't say -- this is a remediation document, management document, so I could not tell whether they were made there or whether they were imported.

**DR. NETON:** If they were imported, it by definition (unintelligible) sources.

**DR. MAKHIJANI:** Yeah. No, so then -- then you wouldn't have an issue.

**DR. NETON:** Right.

**DR. MAKHIJANI:** But if they were made there then obviously these various -- I'd be happy to email you because you know this.

**DR. NETON:** Okay. Okay, if there's no other questions on this.

**MR. GRIFFON:** Jim?

**DR. NETON:** Yeah.

**MR. GRIFFON:** Jim, just one other question on TIB 49. I'm looking at the very back of page 37.

**DR. NETON:** Yes.

**MR. GRIFFON:** And again I've just quickly looked at this, the HAN-1 and the RF872 cases -

-

**DR. NETON:** Uh-huh.

**MR. GRIFFON:** Those -- Those parameters there --

**DR. NETON:** Yes.

**MR. GRIFFON:** They were derived from the lung data. How -- How -- How did you -- How did you come up with those parameters?

**DR. NETON:** Well, Roger could probably speak better but they were fit using the IMBA software, you know, intake to bioassay and you've got -- you've got lung monitoring data and urine -- urinalysis data for these cases. And -- And the moral -- the analysis to give it the best fit to the available data generated those parameters.

**MR. GRIFFON:** Okay. Because we have some problems, well, some differences, you know.

**DR. NETON:** You can see -- You can see them plotted over the top of each other on page 35 and --

**MR. GRIFFON:** Right.

**DR. NETON:** -- they virtually overlap except for, you know, the earlier time periods. As I said, both models -- both calculations were

used and the one that gave the higher derived lung adjustment factor would be applied.

**MR. GRIFFON:** Right.

**DR. NETON:** I do think that this represents in our mind a bounding -- a bounding scenario. Now that -- that -- that will account for the adjustment for the lung doses but you have another issue when you want to start calculating intake because you're going to rely on something such as urine samples. And by definition since the material leaves the lung more slowly, then what's known as the intake retention fraction is going to be different for the more insoluble material. You're going to have less coming out in the -- in the urine per unit inhalation for the super S material than you would for the S type material. To account for that we --

**MR. GRIFFON:** Can I just step away for one second and understand this, Jim? I'm sorry.

**DR. NETON:** Yeah.

**MR. GRIFFON:** It looks to me like these are pretty much -- these sets are -- are they just based on simply mathematical sets or are they empirical because it looks like you're

adjusting any parameter you need to to get the best fill-in data. I'm wondering if -- if there's a point where you can say, you know, well, we -- we don't have any reason from a biological standpoint to modify these parameters differently in the same sets of cases. Do you know what I'm saying?

**DR. NETON:** Not really. I mean you have what you have to modify. You have chemical clearance and you've got mechanical clearance. And when you start modifying those parameters you need to fit -- fit -- you know, you have to fit what's coming out of the lung somehow.

**MR. GRIFFON:** Right. Right.

**DR. NETON:** And as I suggested, almost shutting down the chemical clearance totally still allow for too much lung clearance so clearly there was a mechanical component involved. But Roger could speak for what selection criteria we used for fit as a subject expert.

**MR. FALK:** It was mainly the -- it was mainly the empirical type of the approach, and using the principle that I want to look at the ones that make the most changes and I want to make as few of changes as I can. And so we've

looked at the particle clearance. I first fit the lung data to -- to -- to get the approximately fit and then I used the absorption parameters to then -- then fit the -- then fit the urine data in order to get the same intake assessed by the IMBA code for both sets of data independently. So that was my basic approach.

**MR. GRIFFON:** Okay. The only thing I'm wondering is, you know, if you then went back and said, okay, for all these parameters if I had (unintelligible) and I know that's not what we're doing here but if you had to come up with a constant for a, you know, a super S model then, you know, these -- these numbers -- I only see two of them but I'm guessing that they -- that these parameters don't fall all over the place.

**DR. NETON:** I'm not sure where you're -- you're getting at there, Mark, but I -- I think -- I think what you're saying is that there's a lot of variability among these cases and there are and that's why we deliberately chose the ones that had the longest clearance times. We're not really developing a new super S model.

We're doing a bounding analysis is what I'd like to call it. And -- And we're very confident that it -- the model -- the lung calculation adjustments are -- fairly represent the upper limit of the clearance times that one would experience with Rocky Flats workers inhaling insoluble material.

**MR. GRIFFON:** Okay. That's as far as I'm going to take that one. Thanks.

**DR. NETON:** Yeah. I think you might be -- might be a little more --

**MR. GRIFFON:** That's really what I'm looking at is the variability question, yeah.

**DR. NETON:** And that's why we -- we -- we prefer to call these bounding analyses just because of that, that, you know, clearly we have ten cases and there's -- there's variability even among super S. And the original thought could be, well, let's take the -- the central estimate and put some distributions about that and assign dose clearance parameters to the work force. But we weren't comfortable with that --

**MR. GRIFFON:** Right.

**DR. NETON:** -- because there -- there is still

a lot of unknowns so we said let's take the ones that exhibit the longest clearance times, in fact, the two that did, and use the most conservative of those two in every step of the way. So --

**MR. GRIFFON:** Okay.

**DR. NETON:** Getting back to the next point though is that if you want to now estimate intake, how much plutonium did the person inhale at times zero, this analysis of course doesn't tell you that if you -- if you start from a urine sample. If you start from a lung measurement it's okay because you -- you -- it is what it is. Or if you start from an air sample and you inhale, what's deposited is deposited. If I want to now impute or infer a lung measurement -- a lung intake based on a urine sample we need to look again at the differences in what's coming out in the urine versus the super S versus the S. And again since we are not saying that these -- this is the definitive model we looked at the difference in intake retention fractions at all time periods post-intake that were projected by these calculations, and determined that at --

at any point along the way for chronic intake scenarios there is no more than a factor of four difference projected in intake. That is I think a urine sample at any time post-intake using the super S calculation or the S, I will infer no more than a factor of four difference in intake. In some cases it's much closer than that, and that's what's recorded in figure 1 where we compare the different clearances. In fact we did the analysis for both HAN-1 and Rocky Flats 872. It turns out that HAN-1 projects the largest difference in intake and -- and you can't read it necessarily from the graph but you'll have to trust me that's about a factor -- it is a factor of four I think rounded up from 2.9. So given that then, we are proposing in this I'll call it a white paper right now, in our approach to dose reconstructions with super S, that we would take any intake that was derived from a urine sample that assumed type S and multiply it by a factor of four at any point along the way. So essentially we're adjusting upwards all intakes by a factor of four to account for this difference in -- in -- the lower amount of

uranium -- of plutonium appearing in the urine over time. We did a similar analysis on acute intake scenario and it turns out it can be larger than a factor of four after about a year but under any credible scenario that we feel we would be evaluating we would be doing that acute intake analysis much closer in than -- than -- than a year. And again the factor of four seems to apply pretty nicely for that analysis. And that's what's plotted in figure 2.

**DR. MAKHIJANI:** Can I ask a question about that time frame?

**DR. NETON:** Yeah.

**DR. MAKHIJANI:** In the petition it cites an example if I remember correctly where an acute intake was detected much after the intake only on routine analysis. And so I wonder whether you can make that assumption?

**DR. NETON:** How much -- How much after I guess?

**DR. MAKHIJANI:** I think it was like a -- it was actually on the order of a year. Is there a petitioner? I can look it up. I've got it in my notes somewhere but --

**DR. NETON:** Well, I think that if we know -- if we know the specifics of the case we would apply what the specifics were. But if you -- if you do the analysis, and Dave Allen can back me up on this, if one assumes -- if one has a positive urine sample, and let's say that that positive urine sample is taken well -- a year or more after -- and it was an acute intake, I mean we would model it as a chronic intake exposure scenario. That is giving a person chronic intake all the way up to there. We would -- we would bound his -- his dose using that analysis. That's typically our approach. We --

**DR. MAKHIJANI:** Yes.

**DR. NETON:** We've been down this path at the other meetings where we've shown that chronic intake scenarios are more claimant favorable by and large than the acute intake.

**DR. MAKHIJANI** Yeah. Generally we have -- we've done this. I think we did this in --

**DR. NETON:** I forget where it was but we did -- we've done that. Am I pretty much on target with that, Dave?

**MR. ALLEN**: Yes, we are.

**DR. NETON**: So --

**MR. ALLEN:** Assuming that -- that chronic exposure doesn't stop the day of the sample.

**MR. GRIFFON**: Can't hear a word you're saying.

**MR. ALLEN:** I'm sorry. I'm back from the table a little bit. It's assuming that the -- it's assuming that the chronic intake doesn't stop the day of the sample. If we're collecting a sample that turns out to be high and it's a year after an acute intake the odds are we're not going to realize there was an acute intake. We're going to (unintelligible) his on past that date and this ends up being favorable to (unintelligible) a short time after that date.

**DR. NETON:** Okay. So let us talk a little bit about the different scenarios that one can envision. For the lung if we estimated the lung intake we would just apply that factor four and -- and use that. If it were a GI tract dose we were trying to estimate we would again increase by a factor of four. You would have the -- a lot -- it turns out a lot of the GI tract doses (unintelligible) a clearance from what is called ET 1 and ET 2, the extra thoracic regions of the lung that this factor

of four would boost up and provide a fairly large GI tract dose. We would clear that factor of four dose to the GI tract with type S parameters. In other words, we wouldn't -- we wouldn't allow for this lower clearance. We would just clear it out. And it wouldn't make a huge difference I don't think because most of the dose comes -- the majority of the dose comes from the early clearance of not the lung but the thoracic regions. When we're talking about systemic organs though, those that have to become irradiated after the plutoniums reach the blood streams, we have a slightly different approach here. It is our opinion -- it was at the last Board meeting and it's still our opinion that the -- the amount of material that's in the blood stream is directly proportional to the dose that's delivered to the organ. So we would clear the material from the -- from the lung we would use a type S model. While -- Up to the date of the last bioassay sample we were applying a type S model to clear all the plutonium out of the lung and then after the last bioassay sample there's a problem because you have this potential

reservoir of additional plutonium that you don't know about. And so then we proposed after the person left the workforce and was no longer monitored to increase those values by a factor of four to account for this residual reservoir. I think this is where we had a slight disconnect at the last meeting. You do get a higher dose because you certainly have a higher intake but the dose during the monitoring period itself is the -- I mean you only have so much plutonium you can have in the urine given a certain bioassay profile. So that does a slight twist there with the systemic organs so I've covered lung, GI tract, ET 1, ET 2 and systemic organs. I think that covers the waterfront on -- on those -- on those types of calculations. We went an additional step further and I mentioned at the last meeting, we had the Transuranic Registry cases. It turns out these comparisons were more difficult than we would like and -- and it -- for many of the same reasons that Roger mentioned we've tried to obtain clean cases, cases that were not confused by repeated exposures or they had a high enough -- a

sufficient intake to be detectible above the noise because if you -- if all of your bioassay samples in the Transuranic Registry case are below detectible it doesn't do you any good. You need to have some positives in there to be able to -- to do some comparisons. Nonetheless we went ahead and did a comparison of what was available and that was provided at the very end of the document, sort of as what I like to call an independent plausibility evaluation. In other words, you know, we've -- we've made a couple conservative assumptions at several steps along the way. Does this put us in the realm of -- of -- of -- of ridiculous? Are we way overestimating? It turns out we do overestimate but the factors where inhalations were involved were not really out of the -- the realm of plausibilities. And in fact this analysis that we've done is shown for the -- how many there were --

**UNIDENTIFIED:** It's -- It's --

**DR. NETON:** Table 2.

**UNIDENTIFIED:** Table 2, last page, 8?

**DR. NETON:** Yeah. There were seven cases we were able to compare. The techniques that --

adjustment factors, techniques that I just described would be overestimates if we applied them to the Transuranic Registry cases in the manner that we would normally reconstruct a -- a intake. That is, assume a chronic intake exposure scenario for the duration of their employment. That's the nickel tour of where we're at. Certainly I'm sure you folks have a lot of questions they want to ask. Let's open up the floor.

**DR. MAURO:** I'll start off with probably a dumb question. When I look at figure 1 on your report, let's just -- let's say I want to use figure 1.

**DR. NETON:** Uh-huh.

**DR. MAURO:** I have an individual and what we're saying is he's -- he's chronically exposed and I go in -- I go in at one year, you know, 365 days which collapses you right up close, and then pull a urine sample. Okay. And I don't -- I don't have any idea whether he was exposed to high fired type S, N, or F. Just don't know. But I suspect he's -- he's chronically exposed to plutonium. Now, according to this set of graphs what -- what this is if I assume

that this chronic exposure is type S, I'm going to come up with my highest intake per unit excretion. In other words, whatever you observe in his urine, whether you assume and say one-half of the MDL or at some detected level, the intake that you're going to -- the chronic intake rate is going to always be bounded by assuming that he's being exposed to type S. That is --

**DR. NETON:** Type S times four.

**DR. MAURO:** So this table includes the four.

**DR. NETON:** That's what I don't know if you can probably see the graphic because it's -- we do that in black and white copy but --

**DR. MAURO:** No, no, I have a colored copy.

**DR. NETON:** It's on the right. It's the third one down which is the --

**DR. MAURO:** Oh, I -- Yeah. I'm sorry.

**DR. NETON:** -- gold line.

**DR. MAURO:** I -- I -- you're absolutely right.

**DR. NETON:** So what we're trying to show here is type S which is the green line, would project that.

**DR. MAURO:** I was looking -- I was looking at the type S, not the --

**DR. NETON:** What was very nice about the --

**DR. MAURO:** As I said, it was probably going to be a stupid question, and it was. Now at least I understand.

**DR. NETON:** That was our intent to, you know, we're not extremely confident in all aspects of this model so we'll just take the factor of four and apply it for all times post-intake which we think works out very well for us.

**MS. MUNN:** You're certainly generous. It's bounding from the graph.

**DR. NETON:** Any additional questions?

**DR. MAKHIJANI:** Let me -- let me -- I -- I think the -- the comparisons of the S -- super -- and super S (unintelligible) studied it a great deal sort of correspond to some of the analyses that -- that back of the envelope or preliminary work that we did but the question that I have in regard -- there's a -- there's a question in the petition about mixed intakes. So if you have type F, type M, type S, super S, how do you actually -- that would be a practical situation for a worker and there's a explicit item in the petition claiming that it would be hard to do that back or difficult to

do it or possibly to do it. And -- And just to make the question a little bit more simplified in my own mind, I pos-- I postulate suppose you -- you're into routine bioassay. We have an acute intake and you do a bioassay six months or one year after the intake and it is type F material. How would the systemic organ doses compare because if you -- especially if you have below minimum detectible -- say you have just below minimum detectible -- you have just below MDA after six months or a year your intake from type S would be quite high, higher than possibly the real -- maybe the type F. I do not know because it was very short (unintelligible).

**DR. NETON:** Yeah. Yeah. Well, Dave, do you want to --

**MR. ALLEN:** Well, the whole intent -- I mean what we've been doing all along is taking all the credible probability types and taking, you know -- taking the most claimant favorable ones. And what we're proposing with the super S's is just one more -- one additional credible solubility thing. So if type F is credible, which it's -- it's not a default with the

plutonium -- we've done type M --

**MS. MELO:** (Unintelligible).

**DR. WADE:** Dave -- Maybe you can come up here, Dave, and join us at the table.

**MR. ALLEN:** Sorry. Yeah. I'll just begin again. What we've done in the past is taken all the credible solubility types and assumed the worst case one. In the case of plutonium what we're proposing is that this super S would be an additional solubility code so we would run it as a super S, a type S and a type M and pick the most favorable if they're all credible.

**DR. MAKHIJANI:** So the like plutonium trifluoride and tetrafluoride and so on? I mean I -- I don't know all the chemical forms that are there at Rocky Flats. I haven't made a list but -- but you made a list and excluded type F?

**MR. ALLEN:** Well, ICRP excluded type F for plutonium.

**DR. MAKHIJANI:** Altogether?

**MR. ALLEN:** Yes.

**MS. MUNN:** Arjun, question about the case that you mentioned in the SEC. I don't remember.

That's been awhile since I read that.

**DR. MAKHIJANI**: There wasn't one specific case so far as I recall but there was sort of a bullet point type of item in there to the best of my memory. I might be corrected by a petitioner because there were a lot of affidavits and I have not read them all carefully. That the problem of mixed solubilities would present issues in dose reconstruction and so I tried to kind of juggle that in my mind and -- and --

(Music plays)

**DR. WADE:** Someone put us on hold maybe.

**UNIDENTIFIED:** Right.

**DR. WADE:** Can you hear us?

**UNIDENTIFIED:** (Unintelligible).

(Music plays)

**DR. WADE:** Can --

**MR. GRIFFON:** (Unintelligible).

**DR. WADE:** No, somebody's put us on hold. Can you hear me speaking?

**MR. GRIFFON:** (Unintelligible).

**UNIDENTIFIED:** Who came back on?

**DR. WADE:** What we're going to do is try and lower the volume of that noise and assume you

can hear us.

(Phone rings)

**DR. WADE**: Wait a minute. Maybe something will happen now.

**MS. MUNN**: He’s not home.

**DR. WADE:** Just wait for a minute.

(Phone answering machine message: Hi, this is Kay Barker. I’m either away from my desk or on the phone. If you’d like to leave a message please (unintelligible) operator. Have a good day.)

**UNIDENTIFIED:** I don't know.

**DR. WADE:** Kay Barker? Any way -- anybody know Kay Barker or is Kay Barker hearing my voice?

**MS. BARRIE:** I do know Kay Barker. I’ll email her.

**DR. WADE:** Yeah, would you, please? She’s destroying the whole -- the whole working here.

**MS. MUNN:** Actually it was Kay’s answering machine. Someone was trying to reach her.

**DR. NETON:** Yeah, it was someone trying to reach her.

**MS. MUNN:** Yeah. So we don’t know who that is. They put us on hold to do that.

**UNIDENTIFIED:** Well, the music stopped. Can

everyone hear?

**DR. WADE:** Can you hear me now?

**MR. GRIFFON:** Yeah, I can.

**DR. WADE:** Okay. We'll start back again. Please, also before that happened someone was obviously fiddling with something on their desk or something mechanical and we could hear each noise. So if you're going to be on the speakerphone then mute us, please, and respect everyone else's ability to participate.

(Phone recording plays)

**DR. WADE:** Okay. We're going to try and continue our business. Again, we ask everybody out there to sort of police your actions respectfully. Otherwise we won't be able to have these kinds of calls and I think a great deal of important work will be left undone. So we'll start again.

**MS. MUNN:** I hate to continue because Arjun's not in the room but perhaps someone else can answer the question. If we're not -- are we -- are we just speaking in generalities here? No -- No one is suggesting that there is a circumstance where there would be an acute intake of all these different types of

solubilities. They're talking about the possibility of individuals changing jobs or handling different types of material over the course of a period of years; is that the issue?

**DR. NETON:** I think so but --

**MR. GRIFFON:** (Unintelligible).

**DR. NETON:** Either way though I think that as Dave Allen pointed out, we -- it's been our standard practice to evaluate the plausible scenarios and pick the one that would provide -- if we couldn't tell, differentiate among the exposure types, pick the one that would result in the highest dose to the organ. So, you know, if there was a mixture of 50/50 and we assumed it was all one type that would be the type that would give us the highest dose to the organ.

**MR. GRIFFON:** So -- So Jim, I guess the question relevant to super S would be is there -- and I don't know if there's enough of a handle as to where this may have been an issue -- where you can determine from the urinalysis whether it may be extension (unintelligible) urinalysis that you have, you know, a lot of your numbers, say for example super S exposures

that you're not aware of; do you know what I mean?

**DR. NETON:** Right. And the way we've done our adjustment factors we would apply a factor of four intake above the S and evaluate the dose to the organs. We -- We --

**MR. GRIFFON:** For any case that you were --

**DR. NETON:** That's right.

**MR. GRIFFON:** Okay.

**DR. NETON:** We would -- We would --

**MR. GRIFFON:** And you have enough -- you have enough handle that you could narrow it down (unintelligible) super S was an issue at Rocky or -- or would it be done across the board or I'm not --

**DR. NETON:** Well, it would be pretty much across the board on handled plutonium. I mean there were early assertions that this was just related to the fire but there are other indications that other types of plutonium may be equally insoluble so this would be pretty much handled across the board if we didn't know any better. I mean if we knew the exact type we would assign them but if we don't know, super S would become one of our -- one of our -

-

**MR. ALLEN:** Plausible classes.

**DR. NETON:** -- plausible classes, right. So -- And what you're talking about here as I -- as I discussed previously, you're increasing the one dose by quite a bit but the lung -- most of the lung cancers are already compensated so that really is -- I mean there are some that are on the borderline that might fall in under this new approach which is why we went that way, but then even when you increased the intakes by a factor of four the systemic organ doses that don't concentrate plutonium still don't get any internal dose to an appreciable degree because they just don't concentrate the material.

**MS. MUNN:** Yeah.

**DR. NETON:** So -- And we will -- we will document this with some example dose reconstructions I think. This would be a perfect case where we would show that you -- even with these factor of four adjustments you end up with plausible doses to the individual organs and, you know, which ones would be likely compensable under certain scenarios, that sort of thing.

**MS. MUNN:** And that continues to be a concern, how far outside of plausibility --

**DR. NETON:** Right.

**MS. MUNN:** -- do you get when you start adding factors of four.

**DR. NETON:** Right. But with super S I, you know, I feel we're -- we're -- we're not implausible. I think that clearly there are cases where this stuff just doesn't move out -- out of the lung.

**MS. MUNN:** No, the graph shows that.

**DR. NETON:** The trick is when you get these factor of four differences in intakes and then, you know, you have to account for that in the systemic organs. And that's what we're going to do. I mean that's what we'll account for after the last bioassay sample.

**MR. GRIFFON:** Can I just go back to one more question on that, the clean cases question. How many -- how many people were involved in these fires or what was the (unintelligible) data that you looked at or -- or Roger looked at to identify the clean cases that you were going to use in this model?

**DR. NETON:** Roger?

**MR. FALK:** That's hard to qualify. Basically for the 1969 fire there are about 200 people who were in the building who were -- who were carded after that. Now -- Now -- Now, there were only 25 cases that were noted to be over the one lung burden range at that time. And so -- but there is a whole spectrum of the cases. And one wants to look at the highest cases that have the best good long-term data that we can.

**MR. GRIFFON:** Okay.

**DR. GLOVER:** And then these were compared to over 120 Rocky Flats USDR cases as well to kind of verify the -- the plausibility of the -- of the scenario. We had people who were exposed in the 1969 fire, two later fires, to a variety of scenarios where this potentially could be applicable.

**MR. GRIFFON:** How many USDR cases?

**DR. GLOVER:** A hundred and twenty autopsy cases have been done for Rocky Flats.

**MS. MUNN:** That's good. That's a good sample.

**MS. MELO:** And I (unintelligible) parameters (unintelligible).

**DR. WADE:** We're having great difficulty hearing you.

**DR. GLOVER:** I think I caught her. We had already answered that earlier. We did try doing that, just changing the absorption parameters and the mechanical clearance was too fast. It -- It lowered the lung content faster than what the --

**MR. GRIFFON:** (Unintelligible).

**DR. GLOVER:** -- were shown.

**MS. MELO:** (Unintelligible).

**DR. GLOVER:** I didn't catch that.

**DR. WADE:** Well, you have to speak louder and if you have a handset, please use the handset.

**MS. MELO:** Yes. (Unintelligible) transport (unintelligible).

**DR. GLOVER:** Mechanical transport --

**MR. GRIFFON:** (Unintelligible) data you have to (unintelligible) as well, right?

**DR. NETON:** Right.

**DR. GLOVER:** Right.

**DR. NETON:** It was necessary to change the mechanical transport to account for the overall slower clearance.

**DR. MAURO:** Is that what that ten to the amount of six per day is? In other words, that number is the number you have to sort of get into your

model in order to allow it to do what you wanted it to do based on the empirical data to get -- in other words it was ten to the amount of six per day.

**DR. NETON:** I think that's the chemical solubility.

**MR. FALK:** No, that is the particle transport from the AI3 region.

**DR. MAURO:** Okay.

**MR. FALK:** And we had to basically stop I thought.

**DR. MAURO:** You had to shut that --

**MR. FALK:** Yes.

**DR. MAURO:** -- dramatically. In the end what is the end, the clearance rate?

**MR. FALK:** It doesn't seem like there is much.

**DR. MAURO:** In other words, for all intents and purposes it's sealed. In other words, frozen. And -- And when you do that --

**DR. NETON:** I also have zeros down because we -- we couldn't have anything in the (unintelligible).

**DR. MAURO:** No, no. Everybody's --

**DR. NETON:** You can't have it both ways.

**DR. MAURO:** Well, no, no. In other words,

mech-- here -- here we have a daily intake for unit exclusion. Okay. And embedded in that is some clearance model. Now, if you were to assume that your -- you take a urine sample. You see -- You don't see anything. You don't see anything because nothing is there. Okay. But you say, well, wait a minute. We don't see anything. We're going to assume it's one half the MDL or the MDL, whatever. You're going to pick a number. Then you're going to say if that -- now, we realize that these two things can't happen at the same time but assuming it's at one half the MDL but -- let me try -- this doesn't -- see if this makes sense or not -- then you'll come up with an intake that's based on your graph here that tells you how much is taken in. Okay. Now I have my intake rate and I have my becquerels per day coming in now. Then I go ahead and I run a calculation. If I have these becquerels per day coming in and I assume it all -- none of it's leaving -- now we assume that none of it's leaving. Of course the two are -- does -- does that change your dosing? In other words, for all intents and purposes is that what you're doing? Did I pose

my question the way that -- in other words, you come up with an intake based on your -- your model on figure one.

**DR. NETON:** Right.

**DR. MAURO:** And now I have my intake. Now I'm going to -- now, what you're saying is I'm going to calculate my dose right now to the lung by assuming that the clearance -- that the -- it's four time -- I guess the clearance rate is -- what -- your intake is as if it was four times S.

**DR. NETON:** Right.

**DR. MAURO:** Now you've got your -- you have your intake. I have my -- I have my becquerels per day. Now I'm going to calculate the dose to the lung. Now, embedding that dose to the -- the lung is some assumptions is how quickly it's being cleared. Now, if I assume that it's not being -- it isn't, whatever I assume is my intake rate, is this staying resident permanently in the lung?

**DR. NETON:** Well, that's not what we're doing.

**DR. MAURO:** No, no, I want to see if that -- because that sort of like puts a point at the end of the sentence. It can't be worse than

that.

**DR. NETON:** Well, that's true. But what you have is the adjustment factors that if it -- if it were to clear as type S it has a certain rate. And if it did clear as super S as we calculated --

**DR. MAURO:** Right.

**DR. NETON:** -- there is -- the gist of TIB 49 are adjustment factors of the dose. How much more dose am I going to get per year because they're cleared -- it's clearing slowly. So we just adjusted the doses upward for the -- to the lung.

**DR. MAURO:** The reason I'm posing a question and I'm struggling with it is that you have this empirical data that represents some number of workers, some of which it appears that the material is clearing very slowly; perhaps others not clearing that slow but -- and a lot of the questions that are emerging have to with how -- how confident are we that out of this collection of cases that you looked at --

(Loud noise)

**DR. WADE:** There's a great deal of noise coming from someone.

**MS. MUNN:** Don’t go away. Except you who are making the noise. Go away.

**DR. WADE:** I don't know if that’s just a (inaudible). There’s a great deal of noise coming from someone.

(Noise stops)

**DR. WADE:** Okay. Whoever just did something fixed it. Don’t do that anymore.

**DR. MAURO:** Where I was headed, and what I’m struggling with here is that ultimately the rock you’re standing on are empirical data from individuals who worked at Rocky who were exposed to high fired plutonium. And it represents some finite number of cases that -- that we’re assuming captures the range of conditions that all workers may have experienced. Now, I always ask myself, well, what happens -- is it possible -- what happens if we’re wrong. I’ll go back to what I did before. What happens if it turns out that there are exposure situations where the high fired plutonium was even more recalcitrant? That is, it just isn’t leaving to the extent that it doesn’t ever leave. It just -- In other words, it’s not -- would things change

any? For all intents and purposes that's what we have. First of all, does my question make sense? Do you understand where I'm going with my question or -- or am I missing the point in a way? See, I'm trying to say that maybe -- maybe you've picked a case for all intents and purposes that can't be any worse than that.

**DR. NETON:** I think that's what we're suggesting is that we've looked at ten individual cases with fairly high exposures where we had good data and we picked the worst two cases of that which were very similar. Now, you know, do we have all possible exposure scenarios covered? I don't know.

**DR. MAURO:** Well, what I'm saying is that -- and if it turns out that for all intents and purposes from the point of the lung dose it doesn't really matter because you're assuming for all intents and purposes it's not leaving the lung so it can't be any worse than that. In other words, I'm trying to --

**DR. NETON:** That's not necessarily true.

**DR. MAURO:** -- close here. That's not -- Okay.

**DR. NETON:** There is -- it's not going very fast but it is clearing, I mean to some degree.

I mean the doses, it's -- it's close to not clearing but again if it didn't clear from the -- the lung at all we wouldn't be able to measure it in the urine.

**DR. MAURO:** Oh, I understand.

**DR. NETON:** And in fact if it didn't clear from the lung at all there'd be no dose to the systemic organs.

**DR. MAURO:** What I'm saying is that for most of our cases we're going to have cases where we don't see anything in urine. We -- We know that.

**DR. NETON:** But we're going to assume, like we do with normal missed dose calculations --

**DR. MAURO:** Right.

**DR. NETON:** -- that it's LOD over two.

**DR. MAURO:** Right. That's right.

**DR. NETON:** And then we'll multiply those intakes, if they were S times a factor of four --

**DR. MAURO:** Right.

**DR. NETON:** And say, you know, we're not sure exactly what it is but based on the bounding analysis we've done with the ten cases --

**DR. ULSH:** And you also have to keep in --

sorry, go ahead.

**DR. NETON:** And I was just (unintelligible) if you look at the ten design cases it's a log scale. There -- There's a pretty substantial gap between the third highest case and -- and the two that we've chosen. I mean that's not a trivial difference. So, yeah, I think it's a fairly representative sample -- representative sample of these -- of these exposures.

**DR. ULSH:** You also have to keep in mind we're talking about urine data here but we also have lung count data and that's the piece that we haven't really talked about explicitly here. I think if you could get a handle on could there be cases where there's even slower clearance than what we've estimated and we don't see that from the lung count data; is that correct, Jim?

**DR. NETON:** Well, I mean that's what it shows here, I mean with the design cases. I think there's also this effect that we've talked about where there -- there are some people postulate that the higher exposures actually clear more slowly because of the damage that's done to the lungs just from the --

**DR. MAURO:** Yeah.

**DR. NETON:** -- alpha fibrotic lesions that are created because of the high activity. So in some sense if that were true then this would certainly be -- would even emphasize more the fact that they are more likely bounding analyses. I can't prove that but that would support that contention.

**DR. GLOVER:** One piece of evidence, to -- to say that it never clears, even thorium dioxide has self-inflicted damage sites that breaks (unintelligible). So even these -- there will be some self-induced damage. Even -- Well, it's not Pu 238 but so to support the slow clearance, yes, it's sticking but there are -- it is going to become chemically more soluble, a little bit over time. It's not like plutonium 238 which (unintelligible). But there are damage -- there is damage occurring. It just doesn't sit there.

**DR. MAKHIJANI:** I had a -- sorry. I had a question about figure 3 in your approach dose reconstruction, page 5.

**MS. MUNN:** I don't see 3.

**DR. MAKHIJANI:** I had a question about figure 3, page 5. And I see that Hanford 1 curve

crosses the four types --

**DR. NETON:** Right.

**DR. MAKHIJANI:** -- in less than a year.

**DR. NETON:** Right. That's what I -- I talked about earlier, that when you approach a year the factor can be slightly higher than four. We believe in those scenarios we would be assigning a chronic intake scenario anyways if it were not a known incident. But we would monitor that as a chronic exposure.

**DR. MAKHIJANI:** Okay. I didn't relate our discussion to that figure. Sorry.

**DR. WADE:** Okay. Are we ready to move on?

**MS. MUNN:** I believe so.

**DR. WADE:** Maybe just a brief sort of reminder. Don't put a call on hold. Don't do anything unusual with this. Please keep your phone muted if possible. And let's continue.

**SUPER S**

**DR. ULSH:** Before we leave this issue I'd like to ask all the members of the working group and Mark in particular, where are we with this super S issue now? I mean the action item on the matrix was that we would provide -- NIOSH would provide to SC&A and the Board TIB 49 and

supporting data. We have done that. What goes in the matrix now in terms of what's the next action?

**SAMPLE DR'S**

**MR. GRIFFON:** Right. I think -- I think the action is -- is that sample DR's is -- is what we're down to now I think.

**DR. ULSH:** Okay.

**MR. GRIFFON:** And that should come through the evaluation process I believe, through your evaluation report or in association with the evaluation report.

**DR. NETON:** Right. It would be a supplement to the evaluation report.

**MR. GRIFFON:** Yes. Right. But I think you satisfied the action here except for the partial DR's --

**DR. ULSH:** Okay.

**MR. GRIFFON:** -- listed parenthetically there.

**DR. ULSH:** Okay. Thanks.

**MR. GRIFFON:** Can I ask one more thing, one more follow-up on this item? I was going to ask before and my phone went dead and I had to transfer to another phone but Roger, you mentioned the 200 people in the building, 25

cases with the significant lung burden I guess. Is there a write-up on the follow-up of all these cases or is there any kind of write-up?

**MR. FALK:** There were papers published in the first year or two but there has been no paper to my knowledge that has been -- that has been written describing the long-term follow-up.

**MR. GRIFFON:** Is that -- Is that paper on the O drive or available or has that been (unintelligible)?

**MR. FALK:** It is part of the O drive documentation.

**MR. GRIFFON:** It is a part of (unintelligible)? Okay. Anyone -- Lew, you wanted to say something?

**DR. WADE:** Well, I was just saying that the sample dose reconstruction will not be provided as part of a supplement. There will -- There will be information provided in addition to the (unintelligible).

**DR. NETON:** Supplemental to --

**DR. WADE:** Right. But not as a supplement.

**DR. NETON:** -- but not as a supplement.

**DR. WADE:** Which has a formal meaning.

**MR. GRIFFON:** Yes.

**DR. WADE:** Thank you.

**MS. MUNN:** So, Mark, I'm looking at all the actions under comment number 2, and with the exception of the DR's it looks like they're covered; am I correct?

**MR. GRIFFON:** Yeah, I think so. 1B -- we've discussed all these items, 1B and 1C, correct?

**MS. MUNN:** Right. Yeah.

**MR. GRIFFON:** So yes, I agree except for the sample DR's unless anyone has any other comments there. I think that's all of this.

**COMMENT 4**

**MS. MUNN:** That takes us to item 4.

**MR. GRIFFON:** Yup.

**MS. MUNN:** Comment 4.

**DR. ULSH:** Okay. I'd like to -- this is Brant. I'd like to direct your attention to the first handout that I provided which is the 27 February Matrix Issues and NIOSH Responses. And if you look at page 2 of that document you'll see a reiteration of the comment. The action item here is that NIOSH will provide the data and supporting references to support the assertions regarding the practices for adjusting plutonium, isotopic -- isotopic

ratios and americium in-growth. If you recall, we talked about this at the Boston Board meeting and the question came up -- I think Arjun asked the question about what happens when you start with aged plutonium from which the plutonium 241 has been removed and you might not expect any americium in-growth. All right. And Roger at that time stated that in fact at Rocky Flats the old -- the aged plutonium was blended with new plutonium. And so the action item is that we would provide documentation of that. We’ve done two things. The first, we’ve contacted three long-term former Rocky Flats workers and they’re -- they’re listed here in the second paragraph of the response. The consensus was that blending did occur and it was part of the routine process. A second track that we have pursued is that you’ll see on page -- pages 3 and 4 there is a graphic here. This is a document that we have located. Page 3 is not really that informative. I included it for completeness. But if you look at page 4 there’s a couple of points I want to make from this document. If you look at the very bottom

the first thing -- the first point I want to make, there's a list of plutonium isotopes and you see the weight percent for each of the isotopes. And what you see there for plutonium 241 the weight percent is .3684 percent. And that essential -- this document is from 1987 if I'm --

**MS. MUNN:** Yes, '85 through '87.

**DR. ULSH:** Yes. And that matches pretty well with the plutonium 241 isotopic ratio that you observe in the Rocky Flats environmental impact statement from 1976 to '78 which was about .36. So that that demonstrates is that over that time period the isotopic ratio was stable. So I think that that answers that concern. The other thing to note --

**DR. MAKHIJANI:** Before you leave that, Brant, could I ask a question about that EIS?

**DR. ULSH:** Yeah.

**DR. MAKHIJANI:** Was the EIS based on -- on current measurements like this 1987 document or how was it prepared?

**DR. ULSH:** I'm going to defer to Roger on -- on that.

**MR. FALK:** I was not in the loop for that but I

am presuming that it was from the material control documentation for the site. But -- But I do not know that for a fact.

**DR. MAKHIJANI:** Because just -- just, you know, for the record, EIS has contained a variety of types of information, some more reliable and some less reliable in my experience. And -- And I think this is a pretty big conclusion to base -- this document that you -- from 1987 seems to be pretty clear where the -- when the measurements were made so one -- it -- it -- it seems clear that they were made on contemporary measurements. But since you need that other point I would have less confidence of this time without some -- some evidence that they were contemporary in these measurements.

**MR. LANGSTED:** Yeah, the -- in the 1980 EIS the -- the weapons mix was a fairly classified piece of information all through those years. And to declassify that I believe they took a average over a three or four-year period and it was I believe ’70 -- mid-’70s to late ’70s. And that number was published in the EIS and is referenced and that was the -- that was the number that this is based on --

**DR. MAKHIJANI:** Okay.

**MR. LANGSTED:** -- for that early period.

**DR. MAKHIJANI:** Which would be okay if it were from that period.

**DR. GLOVER:** One of the other items is that the Rocky Flats autopsy data tracks very well with the unbroken curves when you compare at the time of autopsy what the plutonium -- the americium 241 to plutonium ratios are. They do a very nice job of predicting the age of the plutonium and --

**DR. MAKHIJANI:** Starting with this .36 percent?

**DR. GLOVER:** If you used the Rocky Flats defaults.

**DR. MAURO:** So the autopsy data for the 123 cases --

**DR. GLOVER:** Some of them are low precision as lung -- low activity. But the cases where you have reasonable precision in the measurements they do a good job of predicting.

**DR. MAURO:** So you didn’t see any surprises where it was just the plutonium 239 was there without the 241 --

**DR. GLOVER:** That's correct.

**DR. MAURO:** -- or the americium?

**DR. ULSH:** Okay. So there's -- there's another piece of supporting data.

**DR. MAURO:** I've got a related question. The -- The urinalysis work that we were just talking about and the approach that was laid out, let's postulate that, yes, it's bulletproof, works, solves the problem from high fired plutonium, the implications being that, okay, do we have -- do we -- I presume we have urine data across the board from very early continuing on workers?

**DR. ULSH:** Uh-huh. That's correct.

**DR. MAURO:** Do we need the chest count data?

**DR. ULSH:** Do we need it?

**DR. MAURO:** Yeah, if you've got the urine data. In other words -- In other words, what I'm hearing here is were the -- how many -- if you can do it reliably and in a claimant favorable way based on the model that you just developed for high fired plutonium, you basically -- you have your protocol. Then along comes the chest count data. You're going to have that, too. And now, we -- we -- we're discussing this issue. You made your case that the problem that we raised doesn't really exist. So --

But if it did -- but if it did exist, okay, assuming that for some reason we say, oh, we find something out later that says, no, no, no, no. We -- We found -- We believe that there are situations where we just have the -- the plutonium there by itself. Does that problem go away if in fact your urine approach, it works?

**DR. GLOVER:** It does.

**DR. MAURO:** Okay.

**DR. GLOVER:** I mean we talked about that the last --

**DR. MAURO:** Yeah, that's why I'm asking the question.

**DR. GLOVER:** In fact I thought this item was going to be annotated to essentially state --

**DR. MAURO:** To say -- I wanted to hear that.

**MR. GRIFFON:** I need closure on it, too.

**DR. MAURO:** Yeah, I wanted to hear that.

**DR. NETON:** And I think that's true. I mean given all your assumptions and caveats --

**DR. MAURO:** I have a hard time with it.

**DR. ULSH:** The other point that I want to make before we leave this document, the handout on page 4 where it shows the plutonium isotopic

ratios per weight percents, there was some discussion about whether or not the assumption of 100 ppm americium was conservative. In other words, is there -- I think John might have asked, is there a plausible situation where you might have a lower -- lower americium content. And this document also provides some information along those lines. If you look at the top of page 4 there you see number 2, and there are several bullets that follow. And they describe the americium content at various stages of the process, and nowhere is it lower than 100 ppm. In most cases it's higher. So I think that supports the value that we are using in the TBD.

**MR. GRIFFON:** What page is that?

**DR. ULSH:** This is the handout, Mark, that -- the matrix issue responses, and this is on page 4. There's a graphic there of a document I scanned in. And if you look at the bullets there below the number 2 --

**MR. GRIFFON:** Yeah. Got it.

**DR. ULSH:** Yeah. So I think this lends some credibility to the number that we're using in the TBD, 100 ppm, unless we know differently.

**DR. MAKHIJANI:** Brant, in that -- in the second bullet from the bottom?

**DR. ULSH:** The waste stream americium content?

**DR. MAKHIJANI:** Yeah. How -- How do you handle that? Are the -- and maybe Roger can -- are the workers who were working with the waste streams, is that in their records so that you know they were working with americium concentrated sludges and waste streams and things?

**MR. FALK:** I really don't know that that is in the workers' files.

**DR. MAKHIJANI:** So how do you handle the waste stream workers?

**MR. FALK:** Would NIOSH like to answer that?

**DR. NETON:** I'm not sure what's the question. I mean it certainly indicates there was approximately 200 parts per million americium.

**DR. MAKHIJANI:** No, that's -- that's in the plutonium stream. I think the question about the in vivo counting of plutonium streams seems to be answered --

**DR. NETON:** Oh, okay. The salt waste --

**DR. MAKHIJANI:** -- based on the --

**DR. NETON:** -- the parenthetical explanation.

**DR. MAKHIJANI:** And just looking at that parenthetical remark, because I think this has come up in some other context, is how do you -- how do you handle the dose reconstruction from the -- from the workers who were involved with the waste streams.

**MS. MUNN:** Well, if that information isn't in the CATI, how do you know it?

**AMERICIUM 241**

**DR. ULSH:** I'm going to step out on a limb here and ask Dave Allen to correct me if I stick my foot in my mouth. What we are counting when we do a chest count, or let's talk about the chest counts, is the americium 241 gamma.

**MR. ALLEN:** Right.

**DR. ULSH:** If that was in fact not a result --

**MR. ALLEN:** We're counting the americium 241, well, the -- the normal chest counting technique at Rocky Flats and most places is counting the americium 241 gamma and making some correction there for how much plutonium that -- that means. So using the 100 ppm basically we assume that there's what, 1,000 times that amount -- amount of plutonium in the lungs. So I'm not sure where you're getting

at. If it's a concentrated americium stream and we're lung counting, we're going to be overestimating the plutonium.

**DR. ULSH:** That's the point I was hoping to make.

**DR. NETON:** But that -- But that begs the question I guess, just for the completeness, that we don't have lung counting data throughout the operating history of Rocky Flats.

**DR. MAKHIJANI:** Or data for americium.

**DR. NETON:** Classified in that, well, yeah.

**MS. MUNN:** Was this not a wet process? And how --

**DR. NETON:** Salt stream, yeah.

**MS. MUNN:** How -- How would the worker be ingesting these salts in any case?

**DR. NETON:** They were more than likely inhaling I think. It would be difficult to inhale from a wet waste stream.

**MS. MUNN:** Yeah.

**DR. ULSH:** Okay. I don't know if --

**DR. NETON:** I think that's just something we're going to have to think of. It's a good question and we need to -- we need to think

about that unless Roger has some insight he'd like to share with us related to that process.

**MR. FALK:** Well, what we're talking about is the molten salt operation and that started probably late '60s, early '70s, so -- and so we did have the lung counter there. And the method of the lung counter is that there was a possible inhalation situation. The ratio monitors would get a sample of the representative type of the material and we would measure the parts per million in that sample for each lung count case. So we have that measurement and that is documented on report in the claimants' files. So we -- So there shouldn't be any real surprises there. And then the comment -- the comment might also pertain, well, now, what is the likelihood of the exposure to the waste streams. And that was fairly well contained but I don't know if -- but I don't know if -- if there was no possibility for that. But then that would have been measured by a loss of the containment also.

**MR. GRIFFON:** Roger, was there a predecessor to the molten salt process that would have

resulted in -- in kind of waste stream, or no?

**MR. FALK:** There were americium type of separations starting in the late ’50s in building 71 as part -- as part of the purification process for the plutonium. And yes, so there would have been that -- that component which would branch off during the chemical separation starting --

**MR. GRIFFON:** Then I think the issue might still be on the table from that point.

**DR. ULSH:** Okay. I think -- I think we should maybe mark that down as an action item --

**MR. GRIFFON:** Yeah.

**DR. ULSH:** -- that we can provide you some follow-up on pretty quickly.

**MR. GRIFFON:** Follow up on the other. And I agree with Jim earlier that, you know, we did add to the (unintelligible). In other words, you don’t need that. But, you know, this 4 was kind of an (unintelligible) on that, too. But I think to the extent this part might be a site profile issue but (unintelligible) americium is should --

**DR. ULSH:** Okay. So we -- So we close out matrix issue number 4, action item 1 and add a

new issue about americium?

**MR. GRIFFON:** Right.

**DR. ULSH:** Okay.

**MR. GRIFFON:** I think that sounds agreeable to everyone.

**DR. NETON:** Yeah. I think this would be a separate issue --

**MR. GRIFFON:** Yeah.

**DR. NETON:** -- other than 4. I mean it really is not related to the lung count.

**MR. GRIFFON:** It's really not related. We can have a new issue.

**DR. NETON:** It's essentially an americium strain.

**MR. GRIFFON:** It's a new issue within the matrix.

**MR. FITZGERALD:** Could someone restate the issue just based on what --

**DR. ULSH:** I hope someone can. I don't know that I'm the best person to restate it.

**DR. NETON:** I think the issue is that there are -- there are time periods when the in vivo counter was not operating where americium was present in its purified form somewhere in the facility. I think that's --

**MR. GRIFFON:** Yeah. How do you determine the presence of americium in its purified form prior to lung counting.

**DR. NETON:** Given that we have no americium uranium urinalysis --

**MR. GRIFFON:** Right.

**DR. NETON:** -- or in vivo counting capabilities so it would be before the 1960's time frame where this would be relevant.

**DR. MAURO:** If you did have a person that was exposed to the separated americium 241 and you did a chest count and you -- would you also assume that he, along with the americium the plutonium was there also and there -- thereby come up with some I guess unrealistic overestimate? Is -- In other words, I'm looking at -- or do you know when the person is working solely with the separated americium and therefore you know you're not dealing with this -- that gray -- that gray area where you're going to be tricked into thinking he's got a very large plutonium burden?

**DR. NETON:** I think there was a pretty good discussion by Roger earlier that we more than likely know where this person was working.

**DR. MAURO:** Okay.

**DR. NETON:** Or especially if there were an incident, if you were working in that area.

**MR. FALK:** Well, you would also have the plutonium urine data too that would bound that.

**DR. MAURO:** Well, what I'm hearing -- I was -- you never see anything in the urine for plutonium I mean.

**DR. ULSH:** If it's super S.

**DR. MAURO:** Or S -- even is my understanding. Very often you don't see it.

**DR. ULSH:** Right.

**DR. NETON:** But we would assume a certain -- a certain detection limit and apply it.

**DR. MAURO:** Apply it anyway? Okay. Okay.

**DR. ULSH:** The other thing to maybe think about before we leave this issue, and Roger, maybe you can chime in and correct me if I'm wrong. But we did do gross alpha urinalysis in the early years and I think that americium 241 would have been captured in that, correct?

**DR. NETON:** Yes.

**DR. ULSH:** So for the gross alpha measurements I think we would assume the most claimant favorable element for the dose reconstruction.

So this is a way to bound.

**DR. NETON:** Yeah, I think that's right. We probably need to sit back and think about it.

**MR. GRIFFON:** Yeah, I think you might want to sit back and think about it.

**DR. NETON:** I always find it somewhat dangerous to start solving here.

**MS. MUNN:** Solving here.

**DR. ULSH:** That's why Jim has to reel me back in when I start going out too far on a limb.

**MS. MUNN:** Just call it new issue 3.

**MR. GRIFFON:** Yeah, new issue 3. Back to issue 4 though, we -- are we done with that?

**MS. MUNN:** Looks like it to me. Everybody happy where we are? I see nodding heads.

**DR. MAKHIJANI:** Yeah. Yeah. I think, yeah -- I can say we are.

**MR. GRIFFON:** Do you want to delve into issue 6 before lunch?

**UNIDENTIFIED:** I'm game.

**MR. GRIFFON:** All right.

**MS. MUNN:** Well, it's brief.

**DR. MAURO:** Everybody checked out? When is checkout time by the way just to let everybody know about it?

**MR. GRIFFON:** Brant?

**COMMENT 6, CALIBRATION**

**DR. ULSH:** Number 6, action item 1. The question here dealt with the justification for using the NTA film calibration factors for brass track dosimeters in the NDRP. I think this is discussed in one of the comments that I've seen they have sent over in the past week; is that correct?

**MR. FITZGERALD:** Yeah. The calibration issue.

**DR. ULSH:** Okay.

**MR. FITZGERALD:** That's correct.

**DR. ULSH:** Let me just get into it a little bit here. In terms of the glass track plates, these were conduct -- these were read by the Los Alamos Scientific Laboratory, LASL, and really there was never a question about the integrity or the validity of those reads. The NDRP was faced with a choice of whether to include the glass track plates or not to include them. They included them and applied the NTA calibration factor which increased the neutron dose estimates by a factor of about 2.3. Keep in mind though that the original estimates from the glass track plates were not

in question. The NDRP just did this as a claimant favorable moderate overestimate. We don't believe that it would be worthwhile to go back and back those out so that we could lower the neutron doses. So that's our -- that's our response. I don't know.

**MR. FITZGERALD:** Ron? Ron?

**MR. GRIFFON:** I'm not sure NDRP was addressing the claims.

**UNIDENTIFIED:** Right.

**MR. FITZGERALD:** Ron Buchanan, are you on the phone?

**MR. BUCHANAN:** Yes, I'm here.

**MR. FITZGERALD:** Did you hear -- Did you hear the response?

**MR. BUCHANAN:** Yes. Now, the way I understand it there was only 10 to 18 of those neutron track plates used here prior to '55/'56. And then -- then they started doing their own (unintelligible) in '57/'58 time frame (unintelligible); is that correct?

**DR. ULSH:** I'm going to -- I'm going to defer to Roger on that.

**MR. FALK:** I believe that we successfully re-read 692 of the glass plates ranging in years

from 1952 through January of 1957. And so that is the scope of the glass plates. And the difference between the original neutron dose which was evaluated by Los Alamos versus our -- our re-read plus -- plus the film calibration factor was as -- was as Brant stated a factor of 2.3 higher than the original. So the project had a choice. Do we go with the original or do we apply the neutron film calibration factor and get a overall higher -- higher neutron dose.

**DR. MAKHIJANI:** Okay. So what you're saying is by applying the MDA calibration factor -- and was that the reason that you came up with this 2.3 higher dose --

**MR. FALK:** That was --

**DR. MAKHIJANI:** -- than the calibration?

**MR. FALK:** That was an outcome of -- of the -- an outcome of -- of using the neutron film calibration factor on the glass plate of tracks read by our projects. Therefore management decided that -- that -- management decided to actually include the -- the -- the re-reads of the glass plate in the scope of the project.

**MR. BUCHANAN:** What was the condition of glass

plates? Now, I understand glass plates are more fragile than film obviously (unintelligible) than film and some of them were not -- were they in readable shape, most of them?

**MR. FALK:** Most of them were in readable shape. There were -- There were about, I don't know, 30 or 40 of them that were not and therefore we did not modify those doses.

**MR. BUCHANAN:** Okay. So what you're saying then is that apparently based on glass plates were more extensive (unintelligible) than film, NDA films which calibrating factors -- using calibration factors from the film that gave us (unintelligible) dose; is that correct?

**MR. FALK:** I'm not sure that I -- that I heard all of that but there were a couple differences. It turns out that -- It turns out that Los Alamos only read one square millimeter of -- of -- of the surface area whereas the project read ten square -- read the ten square millimeters of it so that was one improvement in the counting statistics as well as the application of the NTA of -- of the NTA film calibration factors. So both of those

were a factor.

**MR. BUCHANAN:** So I assume what you're saying here is that in your opinion that the NDA plates, the doses recorded from them are correct.

**MR. FALK:** I don't know if they are correct but they are claimant favorable relative to the -- relative to the dose of record currently based on the original reads.

**MR. BUCHANAN:** Okay. Arjun, (unintelligible).

**DR. MAKHIJANI:** No. No, I think the -- the, you know, I guess the only question would relate to the original reads and -- and if there's, you know, documentation that the original reads are okay then -- then I think the question would be resolved. But the specific question in regard to calibration would be resolved. I guess (unintelligible) shifted a little bit because I haven't ever thought -- I hadn't thought of going back to the original reads and I did not know the source of the differences so I guess you have documentation about the --

**MR. GRIFFON:** Arjun, I can't hear --

**DR. MAKHIJANI:** I'm asking whether -- whether

the NDRP had documentation about the original reads and the protocols and how they were done and so forth.

**MR. FALK:** Yes, we -- we did capture a lot of that documentation from a trip out to Los Alamos.

**DR. MAKHIJANI:** Is that available like on the O drive or --

**MR. FALK:** No, I do not believe that is on the O drive.

**DR. MAKHIJANI:** Yeah, I -- Yeah, I think -- I think, you know, but the specific question anyway has been addressed.

**MR. BUCHANAN:** It's okay with me.

**MS. MUNN:** So we're done with 6?

**DR. NETON:** Done with 6.

**DR. ULSH:** Okay. The --

**MR. GRIFFON:** I'm looking at your other Word documents that you sent. Is number 6 addressed in this 24 March, 2006 Comments and Responses?

**MS. MUNN:** Yes.

**MR. GRIFFON:** Is that it? Okay.

**MS. MUNN:** That's it.

**MR. GRIFFON:** We've discussed it like two or three times. If we've discussed all the

aspects of this why don't we just scan through?

**DR. ULSH:** Let me look here, Mark, just to be sure.

**MR. GRIFFON:** Yeah.

**DR. ULSH:** We provided the OTIB 50. Let's see. Okay. The justification for using NTA film calibration for glass track. That's what we just talked about.

**MR. GRIFFON:** Right.

**DR. ULSH:** Let's see. Oh, the other one was using one or two neutron calibration spectra to cover all neutron energy spectra at Rocky Flats. That is an issue that was raised in some of the later comments.

**MR. FITZGERALD:** Yes.

**DR. ULSH:** We'll get to that if -- I'd like to defer that if possible.

**MR. FITZGERALD:** We -- We have a general --

**MR. GRIFFON:** (Unintelligible)

**MR. FITZGERALD:** -- Mark, a general discussion of OTIB 50 which I just emailed you a copy of the draft from which the questions which Brant is referring to are derived. We were going to wait until the answers came back before issuing a final but I'm going to go ahead and circulate

a draft along with the answers. Brant told me to circulate the answer to separate questions. So we probably need an OTIB 50 discussion that would involve some of the issues coming out of that review. And we can do it anywhere you want but I would suggest after lunch.

**MR. GRIFFON:** Okay. All right. That's fine.

**DR. ULSH:** Okay. Are we then ready to move on to matrix item number 7?

**MR. GRIFFON:** It might be -- is it time to break for lunch?

**DR. WADE:** There are a lot of hungry people around this table. All right. Why don't we break for lunch and plan on being back at 1:00 p.m. Okay. We'll break the line now and then dial back in at 1:00.

**MR. GRIFFON:** All right.

**DR. WADE:** Thank you all.

**MR. GRIFFON:** Bye.

(Whereupon, a recess was taken from 12:00 p.m. to 1:05 p.m.)

**DR. WADE**: For those of you on the phone, don't put us on hold or don't think you can switch to another line and do something else. We got music and we got all manner of things so, you

know, be very careful with how you deal with this open line. Again, as I said before, it's important work and we want to have this vehicle available to us to do it. I think we've done wonderful work this past two days. So please help us preserve our ability to have these kinds of meetings and these kinds of calls by sort of policing your actions well. And now Ray's going to give you his version of a public service announcement.

**THE COURT REPORTER**: Okay. The audio-visual guy here said in order to prevent the recipients of our telephone from getting so much reverberation they had to turn these mikes down so he said speak close and very directly into the mikes. And we now have these hand-helds so just make sure this green button is lit if you're going to use one of these. And it should stay lit but if it goes off then hit the mute button and it should come back on. But just remember to speak directly because the volume had to be turned down.

**DR. WADE**: Okay. So let's get back to it. We were on a roll this morning and let's see if we can continue that well into the wee hours of

the night as we continue to work around the clock.

**MS. MUNN**: The wee hours being a couple of hours from now.

**PLUTONIUM TETRACHLORIDE CALIBRATION**

**MR. GRIFFON**: Yeah, I think we were on item 7, right?

**MS. MUNN**: Item 7.

**DR. ULSH**: Seven, action item 1.

**MS. MUNN**: Plutonium tetrachloride calibration.

**DR. ULSH**: This issue I think has been superseded by some of the comments that SC&A sent over in the past week. It really should have been that SC&A would review the article by Mann and Boss. They have done that and we have submitted some questions on that article which are included in the -- the other comment sets. So I would propose that we defer that until we get to those -- those other comments if that’s acceptable to everybody.

**MR. GRIFFON**: That's fine.

**DR. ULSH**: Okay. Oh, sorry. I think that is it for number 7. Number 9 is a big one on data integrity.

**DATA INTEGRITY**

**MS. MUNN**: Yes.

**DR. ULSH**: The first action item talks about OTIB 50 and SC&A would review that. And I think that's what Joe handed out this morning; is that correct, Joe?

**MR. FITZGERALD**: Yeah. We went ahead and did a review of OTIB 50. Ron, are you still on the phone?

**MR. BUCHANAN**: Yes, I'm here.

**MR. FITZGERALD**: Yeah, we were going to go ahead and integrate responses to the questions so the cart got a little bit before the horse. I went ahead and circulated the -- certainly the preliminary analysis and that with the answers to the questions is pretty much where we are now with OTIB 50. We did have some issues. We did respond to those issues so I think just so you have the context. You have the analysis as well of the answers to the questions.

**DR. ULSH**: So I -- I -- I think that perhaps the issues that are discussed in this are also included in the comments that we'll be addressing a little bit later; is that --

**MR. FITZGERALD**: Yeah. Yeah.

**DR. ULSH**: Okay.

**MS. MUNN**: Are the items that are underlined and starred --

**MR. FITZGERALD**: Oh.

**MS. MUNN**: -- of particular import to you?

**MR. FITZGERALD**: Actually I started emphasizing certain pieces of that not realizing that it would have to be copied. And when I tried to print it out on the PC over here in the business office the ink ran out. So in keeping with everything else we've gone through today, I decided, well, okay, you have the benefit of some of my scribbles.

**MS. MUNN**: Thank you.

**MR. FITZGERALD**: No other -- no other importance.

**DR. WADE**: Transparency in all things.

**MR. FITZGERALD:** That's right.

**DR. ULSH:** Action item number 2 deals with NIOSH's efforts --

**MR. GRIFFON:** Could you read -- I'm sorry, Brant. It's a little hard now for me to hear you guys.

**DR. ULSH:** Oh, I'm sorry.

**MR. GRIFFON:** I don't have the reverberation

any more but item -- item 1 is now deferred to --

**DR. ULSH:** No. Well, yes. Action item 1 deals with SC&A's review of OTIB 50 which they have completed, and they've submitted some questions based on that in this -- in the later comment sets that we're going to talk about hopefully this afternoon.

**MR. GRIFFON:** Okay. So that comes up under what, one of the (unintelligible) at the end or --

**DR. ULSH:** Yeah.

**MR. FITZGERALD:** Yeah, there's one at the end. And Mark, just for your information I went ahead and emailed --

**MR. GRIFFON:** Yeah, I have that.

**MR. FITZGERALD:** Fine.

**MR. GRIFFON:** Go ahead with number 2 then. I'm sorry.

**DR. ULSH:** Okay. Number 2 deals with NIOSH's efforts to obtain Dr. Ruttenberg's data. That does continue. I'm scheduled to visit with Dr. Ruttenberg in Colorado next week. But again I do want to reiterate as I did at the last meeting that we have realistic expectations

about what the Ruttenberg data might provide for us. I think that if we provide co-worker models that everyone agrees to the real value of the Ruttenberg data, and this is my speculation, would be that it would allow us to do perhaps more precise co-worker calculations. However, I don't want anyone to have the impression that if we don't get the Ruttenberg data we don't have a -- an approach. That -- That's certainly not accurate. The other thing --

**MR. GRIFFON:** I'm trying to remember, Brant, how the Ruttenberg data had originally got to the table.

**MR. FALK:** It was a comment by SC&A.

**DR. ULSH:** I think it was a comment in SC&A's review of (unintelligible); is that correct?

**MR. GRIFFON:** That you should consider that data?

**MR. FITZGERALD:** Yeah. And really it was in the context of the job categories that would enable perhaps a better fit on the modeling. I -- I tend to agree with what Brant's saying, that it's a question of precision that -- that in a way you would be able to apply the model

more precisely having the job categories that Ruttenberg has.

**MR. GRIFFON:** But it sounds like it's probably not an SEC sort of issue.

**DR. ULSH:** Well, that's my contention. I mean it's not a --

**MR. GRIFFON:** Right.

**DR. ULSH:** -- not a closed issue but --

**MR. GRIFFON:** Right.

**DR. ULSH:** -- I don't see it as an SEC issue.

**MR. GRIFFON:** Okay.

**DR. ULSH:** Okay. Can we move on to number 3 then if --

**MS. MUNN:** Uh-huh.

**DR. ULSH:** Okay. Number 3. Okay. This is one that, an SC&A action item that they were going to review our completeness of external exposure data.

**MR. FITZGERALD:** Ron, are you following on the action item?

**MR. BUCHANAN:** Yes, I'm following that. I do not have (unintelligible).

**MS. MUNN:** You're breaking up. We can scarcely hear you.

**MR. BUCHANAN:** Okay. Can you hear me now?

**MS. MUNN:** Better.

**MR. BUCHANAN:** I get a (unintelligible) of -- of external dose data. To kind of summarize my question on 1 and 3 of that sheet that I sent in, there's some questions I've done other work on (unintelligible) posted data. I don't know if Arjun had done anything on that or not.

**DR. ULSH:** Ron, just for clarification, are the three questions that you're talking about the ones that were sent over this past Friday? Is that what you're talking about?

**MR. FITZGERALD:** Yeah. Yeah. He's saying 1 and 3 addresses the -- the comments on OTIB 50, two of them address the what are perceived as gaps perhaps in -- and 1 and 3 address some of those issues. So this is responsive to this particular item but that's all we have at this point.

**DR. ULSH:** Okay.

**DR. MAKHIJANI:** This -- if you ask me, I have not looked at gamma dose or beta dose issues at Rocky Flats. I just looked at the internal and the (unintelligible).

**DR. ULSH:** So is it accurate to say that this action item has been superseded by the three

questions that Ron submitted?

**MR. FITZGERALD:** Well, from the standpoint of neutrons. I think we focused on NDRP and the neutron issue. We probably need to and owe a closeout on anything else that would be on the external side. I think the neutron issue is the big issue --

**DR. ULSH:** Okay.

**MR. FITZGERALD:** -- that we were focusing on. I don't believe that there are other pressing issues that we've identified to date so...

**MS. MUNN:** So from an action item point of view, 3 is actually still open?

**MR. FITZGERALD:** Yeah, but I think we just have to cross a T that, you know, we've identified neutron as the issue in that regard. But we probably need to get back to you and to NIOSH if there's anything else on the external side. We don't think so but we need to firm that up.

**MR. GRIFFON:** Can someone refresh my memory? What document were you reviewing that -- I know was (unintelligible) but (unintelligible) pretty conservative (unintelligible) data that NIOSH provided. What document is that, what date?

**DR. ULSH:** Well, I don't know that we provided in one of our comment responses -- I think it was the responses that we provided for the Boston meeting.

**MR. GRIFFON:** Yeah, I think it was the Boston meeting.

**DR. ULSH:** There was a graph in there talking about how many people were monitored per year but I don't know if that’s the document that we’re referring to here. Is that?

**MR. FITZGERALD:** I'm not sure either.

**MR. GRIFFON:** (Unintelligible)

**MR. FITZGERALD:** That is a little murky but the only issue that we’ve addressed in terms of completeness is the neutron issue so maybe we need to go back along with NIOSH and just figure out where that, you know, that item sits and close it out by next session.

**MR. GRIFFON:** Yeah, I have to take a (unintelligible) to determine --

**MS. MUNN:** Yeah, I thought that went back before Boston actually but...

**DR. ULSH:** Could be.

**MR. BUCHANAN:** Yeah, I don't know, I don't know where that came from. I’m not familiar with

(unintelligible) reviewing the (unintelligible).

**MS. MUNN:** You faded out toward the end.

**MR. GRIFFON:** I think this came out of the -- the document that, Brant, you sent before the Boston meeting, comments and responses for Boston.

**DR. ULSH:** Okay.

**MR. GRIFFON:** Well, I'll try to track that back to you and get a better matrix.

**MR. FITZGERALD:** So maybe we should leave it as an action for us to work with, Brant, and just backtrack this thing and then come back with a -- a response.

**MR. GRIFFON:** Yeah.

**MS. MUNN:** Good. Think it over.

**DR. ULSH:** I guess the next action item is number 4 under comment 9, and that is the co-worker data. I'd like to give you a little -- a brief update on where we are with that. We have CEDR data for both internal and external. We also have the site -- site database, HIS-20, and we are in the midst of comparing those two data sets. And the preliminary analyses look pretty good but we are still doing some QAQC on

both of those data sets. We anticipate having that up in fairly short order.

**MS. MUNN:** So it's still an open item?

**DR. ULSH:** Yes, it's still an open item for us.

**MR. GRIFFON:** Can you -- Can you just repeat that a little? You've got two databases that you're --

**DR. ULSH:** We -- We have both internal and external data from CEDR. We also have internal and external data from the site database, HIS-20, that's the name of the site database. And we are currently comparing the two to determine whether they match. And so far the preliminary analyses look pretty good but we are still doing some QC on -- on both data sets.

**MR. GRIFFON:** But -- But can I -- can I ask a question on -- on pedigree? I mean aren't you using HIS-20?

**DR. ULSH:** I'm sorry. Using what?

**MR. GRIFFON:** Aren't you using HIS-20 databases for the project? Wasn't CEDR developed from HIS-20? Seems to me you're validating against something that came after.

**DR. ULSH:** No, actually, Mark, what we're -- what we're doing, for the external I'm pretty

sure that we're going to wind up using HIS-20. For the internal we have -- ORAU has developed a -- a draft TIB for us that used CEDR data and we are considering the time frame available. We're trying to determine whether it makes sense to use the CEDR data and validate it against the HIS-20 or whether to (unintelligible). We've done some comparisons between the two and they look very similar. But that's from the internal side.

**MR. GRIFFON:** And can you from a co-worker's model -- I don't know if you could sense this at all. I don't think if we were after this but the question did come up about how -- what -- what fraction of potential claimants would require co-worker data to be viewed, sort of like we looked at at Y-12. It was a fairly large percentage though; I think we had the impression it would be a small percentage for the Rocky workers. Is that --

**DR. ULSH:** Well, coincidentally I have some information hot off the presses from Matt Smith that we currently have two Rocky Flats cases on hold for co-worker data.

**MR. GRIFFON:** Okay.

**DR. ULSH:** Out of about 1,000 claims -- over 1,000 claims.

**MR. GRIFFON:** So there's only two out of 1,000?

**DR. ULSH:** Well --

**MR. GRIFFON:** Or is that something (unintelligible) true? Okay.

**DR. ULSH:** Right. There are two that are identified as being on hold for co-worker data.

**MR. GRIFFON:** But is it fair to say that it's a much smaller fraction --

**DR. ULSH:** I think it's --

**MR. GRIFFON:** -- that are required --

**DR. ULSH:** I think that is fair to say, Mark, that it is a much smaller issue here at Rocky Flats. Okay. Action item number 5 unless anyone has anything else for that. Action item number 5 deals with a number of issues, blanks and zeros in the record. And let me see if there's anything else here. Oh, neutron monitoring, readings found to be in error until the 1970s and the dosimeter chips were sometimes destroyed or lost during processing. I think, Joe, correct me, but I think all of these issues have been included in the new data sets that you sent over; is that accurate?

**MR. FITZGERALD:** Yeah, the list and comments, yeah.

**DR. ULSH:** Yeah. Okay. So it might be, Mark, that this item has been superseded by the new --

**MR. FITZGERALD:** Well, the new one is -- is simply I think a consolidation --

**DR. ULSH:** Right.

**MR. FITZGERALD:** -- an itemized list of the data integrity issues. Mark, you're familiar with that one, the piece that Arjun originated that -- that we wanted to put together just so we wouldn't lose all these various -- I think it was actually Dr. Ziemer who requested a sort of an itemized complete list of all the issues that were not only listed here but also included in the petition. So we have one place where all these issues were -- were listed. And that was the purpose of that piece.

**DR. ULSH:** Yeah, that's a good clarification. Thank you. The list is new in that it just was delivered to NIOSH but not all the issues in the list are new.

**MR. FITZGERALD:** Right. It's a consolidation of both the petition issues --

**DR. ULSH:** Right.

**MR. FITZGERALD:** -- as well as the issues in here.

**MS. MUNN:** So the statement that the allegations should be addressed in the petition evaluation remains outstanding?

**MR. GRIFFON:** Just to go back for a second. I think I have -- there -- there is this document, Brant, that you developed following the Comments and Responses, for Bob.

**DR. ULSH:** Right.

**MR. GRIFFON**: And on page 5 of that document it's under response for number 9, question 5.11.2, -- 5.11.2. There's a -- There's a response to (unintelligible) data and it's titled that way (unintelligible) matrix (unintelligible) item. I think the idea was for asking me to look over that.

**DR. ULSH**: That's action item 3?

**MR. GRIFFON**: That's action item 3, correct.

**DR. ULSH**: Okay. Just to clarify. It's not one of the handouts for today. It was the responses that I prepared for the Boston meeting.

**MR. GRIFFON**: Correct.

**DR. ULSH**: Both SC&A and I are laughing because it's hard to keep all of these balls in the air. Okay.

**MR. GRIFFON**: Right.

**DR. ULSH**: So all of these issues I think in action item number 5 are included in the new list and we have addressed them in the handouts, and hopefully we'll get to that a little bit later to discuss those responses.

**MS. MUNN**: So what we have today that we haven't discussed yet is SC&A's review as it applies to the SEC.

**DR. ULSH**: Review of --

**MR. GRIFFON**: Wanda, I can't hear you.

**MS. MUNN**: I was just trying to clarify in my mind that what we're going to discuss later is SC&A's review as it applies to the SEC petition in question -- review of these questions.

**DR. MAKHIJANI**: Ms. Munn, it's because it's not a review. It's a -- It's a -- what I did was simply go over issues raised by -- by Joe and Steve on the site profile and go through the petition and compile the issues that looked like data integrity issues and do a list.

**MS. MUNN**: Okay.

**DR. MAKHIJANI**: As Dr. Ziemer suggested.

**DR. ULSH**: Okay. That takes us to action item number 6 I believe. There's a NIOSH action item here that we need to research this question further and the question is NIOSH to follow up on inappropriate low energy photon detector correction factor that may have been used as stated in the 1993 DNFSB report. Jim, help me out. Where are we going to -- That's another ball in the air that I --

**MR. LANGSTED**: Yeah, Jim Langsted here. We've been researching this and trying to find more specifics on the issue and can't find anything from the DNFSB on this subject. But what we believe it is was an issue that came up in the early days of the DOELAP accreditation process. They at one -- one time had a K-16 X-ray technique that they used for low energy photons and then they also had an M-60 X-ray technique. And it turned out there were some significant problems evaluating these two together and the DOELAP ultimately dropped the K-16 method. And we believe it has to do with that and the response of our dosimeters and the algorithms that were used to process this data. We're

looking at that and we'll have a -- an analysis on that available here shortly.

**MS. MUNN**: So it's still open.

**MR. GRIFFON**: Okay.

**DR. ULSH**: Okay. Action item number 7; that we will determine the extent and nature of the criminal investigations and/or security investigations mentioned by the petitioner during the Boston working group meeting. On March 15th I sent a letter to Tony DeMaiori that is included in your handout on page 6, a copy of that letter requesting that he provide -- he mentioned in his comments that he had a number of these investigation reports in hand. And so we requested that he send those to us or just give us the citations so that we could search them down ourselves and to date we have not had any response on that. So I think that's where we are with -- with this issue.

**MR. GRIFFON**: Tony on the -- on the phone?

**DR. WADE**: He wasn't earlier.

**DR. ULSH**: He didn't announce earlier. I don't think he is actually.

**MS. MUNN**: No.

**MS. THOMPSON**: Tony's not on the phone right

now because he's meeting with a person from (unintelligible) and Associates at his office. This is Jennifer Thompson. He received the letter and actually you will be getting a letter in response that he just sent yesterday. And she is picking up a work copy of the report and you have contact information as to how to get association reports. They're not covered documents. He can't really ask for (unintelligible) but you guys should be able to get copies of them from the DOE (unintelligible).

**DR. ULSH**: Okay. That's great. If you can just give us the citations we'll -- we'll run them down.

**MS. THOMPSON**: (Unintelligible) that you should be receiving.

**DR. ULSH**: Okay. Thank you.

**MR. GRIFFON**: Thank you.

**DR. ULSH**: Okay. Number 8, action item number 8; NIOSH will demonstrate the reliability of bioassay and external database. I think we talked about that under co-worker.

**MR. GRIFFON**: I think that's a --

**DR. ULSH**: Oh, is this a different issue?

**MR. GRIFFON**: Well, NIOSH is a different issue in that you -- you took (unintelligible) going back to the raw data.

**DR. ULSH**: Okay. So the issue is to go back from the HIS-20 database and compare it to the paper records?

**MR. GRIFFON**: Right.

**DR. ULSH**: Okay.

**MR. GRIFFON**: Or -- Or -- Or (unintelligible) as one of the possibilities that we have used for the Y-12 effort.

**DR. ULSH**: Okay. That effort also continues. It's not closed yet. We haven't found any problems yet but I -- I don't want to say that our analysis is completed.

**MR. GRIFFON**: I mean do you know if there is raw data available though or are you (unintelligible) been able to find that much?

**DR. ULSH:** There is raw data available. Jim, how about if I defer to you and you can talk about what -- what records are available and the -- the claimant files. And Craig Little might also have some input to provide on that.

**MR. LANGSTED:** Okay. I was dozing. No, I wasn't dozing off, no, sorry. In -- In terms

of the -- the comparison between the electronic database and the -- the bioassay and the external dosimetry data, in terms of external dosimetry the Kaiser Hill as they pulled together the claimant files did do a QC check between the electronic data and the data that was in the claimant's health physics printed file. And that data was -- was carefully checked and there was a -- a QC sheet that was generated as that happened. And so all the files that have been sent over for claimants have been checked in terms of external. To take that one step further back to the original laboratory --

**MR. GRIFFON:** Can I ask you just -- just to stop there? I'm sorry. That -- That comparison of working in claimants' files versus working in a database, what's in the claimant's file, is that -- I'm not sure with Rocky Flats but is that a (unintelligible) on the database? I mean or is it -- or is there another source record?

**MR. LANGSTED:** Both the print -- both the printout from the electronic database and the records that were generated at the time and put

in the workers health physics file are provided for the claimants.

**MR. GRIFFON:** Okay. Okay. Because I imagine printouts would (unintelligible) pretty well. I was hoping that the others would be a more useful check.

**MR. LANGSTED:** Yes, one would -- yeah, one would help the printout -- would join up with the electronic, exactly. Exactly. And it turns out the printed records that were in the file, and as I -- I talked about at Boston, Rocky Flats was their primary source of record keeping for health physics records was the printed file and the -- the data that went into that printed file. The electronic database, of course, came on later on as computers became available. But -- And a lot of work has gone into that electronic database so we're fairly comfortable with using that electronic database to generate the co-worker data and it --

**MR. GRIFFON:** Is there any kind of rolled up (unintelligible) or (unintelligible) you couldn't get (unintelligible) matched pretty well. And there's a letter that goes along with the -- a QC letter. Are there any sort of

roll up reports that (unintelligible) and X number of claimants processed and we, you know, we -- here's our QC reports and sort of summary of the records (unintelligible) database testimony.

**MR. LANGSTED:** No, Kaiser Hill did not keep a tally of --

**MR. GRIFFON:** Right.

**MR. LANGSTED**: -- of how accurate that was. You know, in retrospect that would be a nice piece to have here. What we do have is the next step back in that process for external dosimetry. Craig Little will talk about some analyses that he has done on some of the records. And this was actually going back to the original laboratory worksheets and comparing those with the data that's in the health physics file now. Another -- Another link in the chain I guess. And he -- he took a look at that data and has some material we can go over here when you guys think that's appropriate.

**DR. ULSH**: That would be now.

**MR. LANGSTED**: Okay.

**MR. GRIFFON**: (Unintelligible)

**MR. LANGSTED**: Let me pass the -- Let me pass

the microphone on to Craig.

**MR. LITTLE:** What we did over the -- pardon me -- over the last month was we looked at scanned in data sheets, laboratory -- laboratory data sheets and pulled data sheets that corresponded to claimants. And we went back to the -- it's a scanned in -- scanned in file of a -- of a handwritten data sheet. We went back to -- we found about 2,800 pages of those and we went through those and compiled over 400 person quarters or worker quarters of data if you will where we have a handwritten data sheet that's complete for a quarter; and we compared that to -- to the data that's in the -- that's in the claimant file in -- either in the HIS-20 or the -- it's a computer printout that's part of the data file. And most of the cases, and I would -- in every single case where we found a complete match of a quarter or an annual -- an annual case the claimant file either matches exactly or has a larger number than the number that's found in the -- in the beta gamma laboratory worksheet. But the difference is data that's neutron data that we haven't been able to find the -- the handwritten data sheet

for yet. And that's our -- that's our presumption anyway but it -- but it -- And 80 or 85 percent of the cases we -- where we found complete annual data sets, the data match exactly. And the remaining 15 percent or so they don't match and the -- and the missing link if you will is neutron data because the claimant data file, that is the data that's in the claimant's file is a -- is a larger number than the number that I found which simply means that there's some -- some dose that I haven't found a piece of paper to represent yet. There's no evidence of any systematic bias or anything of that nature. And we tried to find doses ranging -- well, we didn't search for doses exactly. We just searched -- we randomly pulled -- pulled claimant files if you will, and I did this for ease of use if you will. I -- I pulled claimants from a number of different last names starting with A and working down through W. And -- And just then tried to go through the data for the these -- the periods that I had which were mostly mid-'60s, late '60s, and pulled -- pulled corresponding handwritten data sheets, entered

those into a spreadsheet and then did -- simply did a calculation to show that the numbers were the same number. So...

**MR. GRIFFON**: Did -- Did you write this up or is this written up anywhere?

**MR. LITTLE:** It's not yet. We're still sort of in process on it. But we can get it written up fairly soon.

**MR. GRIFFON**: Sounds very useful, yup.

**DR. ULSH**: Okay. Unless anyone has anything else to add that's action item number 8.

**MR. GRIFFON**: What do you hear on the internal dose? That was external. Is there anything on the internal side?

**MR. LANGSTED**: Internal dosimetry records are somewhat more problematic. The laboratory -- the basic laboratory data was not or could have been archived but there has been no effort to pull that data and compare it to what's in that database. The laboratories have changed over the years and -- and data has come in from various forced. We have some documentation discussing how the data came into the database, you know, and as the years progressed laboratories started to submit electronic

deliverables that were then put directly into the -- the database. But that is a larger effort over -- over multiple years and we don't have any QC data available on that issue.

**MR. GRIFFON**: Well, I guess -- I mean it's still an open item I would say, yes. I mean is there any -- any help with (unintelligible) or anything like that maybe you could pull for summary statistics?

**MR. LANGSTED**: Well, the -- the worker -- the health physics file, the printed file -- does it have the bioassay?

**MR. LITTLE:** Some of the claimant files do.

**MR. LANGSTED**: Yes, the claimant files do have data in there and we could do a comparison between that and the -- the computer file similar to what Mr. Little did with the external data.

**MR. GRIFFON**: Okay. And again I'm assuming that the (unintelligible) printout of each one.

**MR. LANGSTED**: I'm sorry. Say that again.

**MR. GRIFFON**: I'm assuming that for all sources that you (unintelligible) HIS-20. There wouldn't be a printout of data.

**MR. LANGSTED**: Correct.

**MR. GRIFFON**: In the person's file.

**MR. LANGSTED**: Yes. What's in -- what's in the person's file predates the HIS-20.

**MR. GRIFFON**: Okay.

**MS. MUNN**: That's in addition -- that's a new item for me, Mark. I only -- I only had the external.

**MR. GRIFFON**: Oh, so (unintelligible) external.

**MS. MUNN**: Right. Okay. Thank you.

**DR. ULSH**: Okay. So we'll put that down.

**MR. GRIFFON**: Okay. We'll leave that open and -- and ongoing on external but it sounds like you've made some progress in that discussion. Okay, Brant. Sorry to cut in there.

**DR. ULSH**: No, no. That's all right.

**MS. MUNN**: Takes us down to new issues.

**DR. ULSH**: Takes us down to at least on -- on the matrix that you circulated, Mark, from the February 27th meeting this is new issue number 1.

**MR. GRIFFON**: Right.

**PENETRATING DOSES PRIOR TO 1976**

**DR. ULSH**: And this was the roll up of the penetrating doses prior to 1976. And the comment was that it is not clear how the

neutron and photon doses will be determined from the roll up dose. This is also an issue that is reflected in the new lists that contain both new and old issues so I think that we're going to get to that when we cover some of the -- cover the responses to the -- to the new list.

**MR. BUCHANAN**: Yes. This is Ron Buchanan. The (unintelligible)

**DR. ULSH**: Ron? Ron, it's difficult to hear you again. Can you get closer to the phone?

**MR. BUCHANAN**: Yes. New item number 1 has pretty much been answered, you know, (unintelligible). The only (unintelligible) for 1970 (unintelligible).

**UNIDENTIFIED**: That's in the questions?

**DR. ULSH**: Right. That's in the questions that SC&A sent over so we'll -- we'll cover those in -- in due course.

**ALGORITHM**

New issue number 2 has to do with the problem with the algorithm and this was a -- an SC&A action item on this.

**MR. FITZGERALD**: Actually at the Boston meeting we got an explanation and I think the -- the --

the very last line we would continue to review that in the context of the overall review. I'm not sure that it was really an action item per se. I don’t think there was any disagreement. We just figured we would leave that open in terms of any other issues that would come out of our NDRP review. But I don’t think there’s any new issue. Ron, do you have anything on issue 2?

**MR. BUCHANAN**: Yes, on issue 2, we discussed that I think (unintelligible) and we feel (unintelligible) evaluating it both ways, both (unintelligible) and neutron is claimant favorable. I don't think neutron (unintelligible) on that.

**MR. FITZGERALD:** Okay. That’s what I thought. Okay. Thank you.

**MR. GRIFFON:** I think we can pull it up and close it out.

**MR. FITZGERALD:** Yeah.

**MR. BUCHANAN:** I agree with you (unintelligible).

**DR. ULSH:** And that takes us to the end of the February 27th matrix. Mark, you’re kind of the emcee here.

**MR. GRIFFON:** Well, you lost me. You deferred so many that I'm not sure where we are. But I think we're deferring them mostly because it's little, right? The --

**DR. ULSH:** Yes. There are two new sets of responses. One is dated 21 March, 2006 and one is dated 24 March, 2006. I would propose unless you want to do something different that we just walk through those.

**MR. GRIFFON:** Yeah. What I -- What I may do just to keep with our format, I may try to add these issues into the matrix.

**DR. ULSH:** Okay.

**MR. GRIFFON:** And roll up -- I think some of them will be removed from some areas and put into these new areas. I do want to keep these items in there. I should say also I think the -- were all these comments in -- in response to the list of issues generated by Arjun through reviewing the petition; is that correct?

**MR. FITZGERALD:** This is the longer consolidated list. I mean is your piece responsive to that longer list or to the original matrix list of the integrity issues?

**DR. ULSH:** There were -- okay, I gave three

handouts. The first one, the 27 February 2006 Matrix Issues was our responses to selected items from the matrix that we just covered. Then we received 17 -- a list of 17 concerns this past Wednesday and this handout contains our responses to those.

**MR. FITZGERALD:** Which is affirmative to that question you just had, Mark.

**MR. GRIFFON:** Okay.

**DR. ULSH:** Sorry. The short answer is yes.

**DR. NETON:** What is this one then, 24th?

**DR. ULSH:** Twenty-fourth is three questions that I guess Ron Buchanan sent.

**MR. FITZGERALD:** Ron Buchanan, as part of OTIB 50, came up with three issues which are actually identified in his analysis and that was the preliminary analysis I circulated today and emailed to you, Mark. And these three issues were the ones that were highlighted in particular in that review. And I mean Brant has passed around answers or responses to those three issues.

**DR. ULSH:** Yeah, that’s the 24 March 2006.

**MR. BUCHANAN:** Yeah, this is Ron. I want to clarify about OTIB 50. We didn’t really feel

there were necessarily a lot of SEC issues. However, dropping out of all the neutron documentation, the -- the TIB, the (unintelligible) and OTIB 50 were three issues I felt that we need to address from an SEC point of view. And those are the ones we listed as the three main questions and I guess your date is the 24th of March on that. The OTIB 50 itself, any comments on that was mainly a site profile issue. The three questions are more the SEC type issues.

**COMMENT RESPONSES, MARCH 21, '06**

**DR. ULSH:** So we've got two sets of comment responses to go through, Mark. Do you have any preference? Shall we just go in chronological order?

**MR. GRIFFON:** Yeah, that -- that's fine.

**DR. ULSH:** Then I would direct you to the handout titled "21 March, 2006, SC&A Comments and NIOSH Responses," and we'll just walk through. Comment number 1 dealt with the zero entries in the dose record when badges were not returned. That was a carryover from matrix comment number 9. And there were two periods of concerned, before 1964, and 1964 and after.

And in the response that you see on page 2 of my handout I give an explanation. Let me just walk you through. Before 1964 a blank indicates that the worker was not monitored. On the other hand a zero before 1964 indicates that a worker was monitored but there was no positive recorded dose. Now, in both of those situations we have methods for dealing with it, either through applying missed dose or unmonitored dose using the co-worker data if necessary. And then the time period of 1964 and after a blank or a zero could -- could indicate a period when a badge wasn’t returned at the scheduled badge exchange and Jim Langsted talked about that at the Boston meeting. Occasionally workers would miss badge exchanges. Perhaps they were sick on the day they were supposed to turn it in. Maybe they just forgot. But in any case they would continue to wear that badge for another badge exchange cycle. When the badge was turned in it was read and the recorded dose would be assigned to one badge quarter. I don't remember if it was the first or the second.

**MR. LANGSTED:** Second.

**DR. ULSH:** The second badge exchange cycle. For the other -- the first badge exchange cycle they could put a blank in. Or if the computer programs at the time required it they could have entered a zero. In either case NIOSH would handle it by treating it as missed dose because there was a continuous badge. I mean the worker was badged throughout the entire period so we would treat that as a missed dose in either case. A zero entry could also indicate -- after 1964 it could indicate that there was no positive recorded dose on the badge. And if that's the case then we would simply assign a missed dose. Now, there was another question about no data available and what that means when it shows up in the dosimetry records. And what that could mean, either a badge was not turned in or it was turned in and there was a problem with the badge. And there are a number of situations that constitute a problem with a badge, a suspect badge reading. When that happened the internal -- the dosimetry staff conducted an investigation. Things that could lead to -- could have triggered an investigation like this

would be a suspect high badge reading and there are a number of things that could lead to that: presence of contamination on the badge, detergents, solvents, hair, body oil. When those get on a TLD crystal and the crystals are read can lead to an anomalously high reading. The results of those investigations -- oh, the most obvious answer, too, is the high reading could be real. It could be the worker received a high dose. When -- When a reading was suspect this investigation would commence and the results of this investigation would be placed into the worker's health physics file. However it may not have been communicated to the worker. So from the worker's standpoint they could have turned in a badge, gotten back a report saying no data available, and, you know, it may not be obvious to the worker what had happened here. So that is -- is what we have when we have --

**MR. GRIFFON:** Two questions on that, Brant.

**DR. ULSH:** Okay. Shoot.

**MR. GRIFFON:** That procedure that was formalized, what year was that procedure?

**DR. ULSH:** It was in the '80s. Jim, do you

have the date?

**MR. GRIFFON:** '88?

**DR. NETON:** Those are -- Those are '90s.

**DR. ULSH:** The procedures that the internal or that the dosimetry section used, Mark, weren't formalized until -- formalized into the form of a procedure until those documents that you see there but they were followed earlier than that. I mean they were followed in the earlier time period so they didn't put them all together into a procedure until that date.

**MR. GRIFFON:** But the ones you listed there were -- what years were those? It doesn't say.

**MR. LANGSTED:** Those are 1990 -- sometime in the '90s.

**MR. GRIFFON:** Yeah.

**MR. LANGSTED:** On that subject, in the '80s if you look two pages forward on page 4 there's a diagram. And that comes from a set of operating procedures from 1983. And in that procedure things were not as formalized but there is a section in that procedure that instructs the technicians to take anomalous readings to the supervisor for resolution.

**DR. ULSH:** Yeah, there's a Link and Pennock

reference that’s listed in the caption for figure 1.

**MR. GRIFFON:** They also -- in looking at the petition I do recall a specific allegation that this practice or concerns about this no data available when individuals felt that they were in a fairly high exposure area. And I wonder if you -- that was part of the petition package it might be useful to track a very specific case back to the (unintelligible) file and see if in fact that this procedure was followed. I don't know if there’s other specific case number that can be tracked and say yes, it did work and it didn’t work. Since there was a specific allegation in the petition I think it’s worthwhile to -- we do have the specific example given in the petition.

**DR. ULSH:** Okay. So we’ll put -- we’re putting that down as an action item, Mark.

**MS. MUNN:** So let me understand correctly. In the case where you had perhaps less than an attentive employee --

**DR. ULSH:** I'm sorry. Could you repeat that?

**MR. GRIFFON:** I can’t hear.

**MS. MUNN:** You have a situation where you have

less than attentive employees who do not see that their film badges are rotated on the regular basis that should be. There is an excellent possibility that their dose will be overestimated by whatever you consider the LOD of that badge to be for as many times as they failed to rotate their badge.

**DR. ULSH:** It is correct that we would apply the missed dose to each -- let's say a worker wore his badge for three badge cycles, which I think would be unusual --

**MS. MUNN:** Yeah, it would.

**DR. ULSH:** -- but let's just say that it -- that it happened. What you would essentially have is the recorded -- the dose -- the dose that was recorded on the dosimeter, the film badge or the TLD, would be recorded in the third exchange cycle. For the first two exchange cycles we would apply missed dose so yes, that would be claimant favorable.

**MS. MUNN:** Okay.

**MR. GRIFFON:** And at least that's as it's described.

**MS. MUNN:** At least what?

**MR. GRIFFON:** I agree that as it's described,

at least the way you're characterizing it I agree that would be claimant favorable. I think we've heard, you know -- I think we (unintelligible) you know.

**MS. MUNN:** Considerably more than that, you know.

**MR. GRIFFON:** Make sure we (unintelligible). I think it's more than claimant favorable. The one scenario I remember was the (unintelligible) three quarters out of six and each one of those or he -- he claimed that there were high exposures. I think he was a radium technician. He claimed there were the highest dosed area and each one of those (unintelligible) didn't have data -- no data available. Now, (unintelligible) important. But I think we have to follow up on this.

**DR. ULSH:** Okay, Mark. So the action item that -- that -- that we go forward with is to track back and make sure that this -- demonstrate that this procedure actually occurred.

**MR. GRIFFON:** Or if possible try to find specific examples.

**DR. ULSH:** Oh, some examples. Okay.

**MS. MUNN:** I got the impression Mark was

1 particularly interested in the one case where
2 the claimant maintained --
3 **DR. ULSH:** If -- Mark, I can tell you if -- if
4 that situation deals with a claimant it will be
5 fairly easy for us to do I think. If it's not
6 a claimant I don't know that we'll have access
7 to his records.
8 **MR. GRIFFON:** Yeah. I'm not sure about that.
9 **DR. MAURO:** Excuse me. This is John Mauro. So
10 in the case where there was a recording of no
11 data available the position is that the policy
12 was that that probably was some malfunction of
13 the readout. You had mentioned that you would
14 -- you would read it out; there would be some
15 kind of unusually high reading that -- that
16 sort of just didn't seem to make sense. I know
17 this is a great concern to the petitioners.
18 **DR. ULSH:** Yes.
19 **DR. MAURO:** Now, if you were to run this to
20 ground -- in other words, if I was a petitioner
21 and you were to tell me that, well, no, no, no,
22 it wasn't that we just pushed that aside. We
23 have reason to believe that in fact it was a
24 false high reading. I guess how would you go
25 about doing that? Would you go to, for

example, other data for where he was and that perhaps area monitors? In other words, how do you convince a claimant or a petitioner that in fact he did not get that dose, that it was a scurrilous high result? What would be done to -- convince me, for example, if I were that person.

**DR. ULSH:** Well, we could refer to the procedures that we've referenced here that -- that direct the dosimetry group for when this investigation would be triggered and what the outcome would be. We could also look it it's -- again, if it's a claimant --

**DR. MAURO:** Yeah.

**DR. ULSH:** -- we could also look in the claimant's record at an investigation report that should be included in there.

**DR. MAURO:** The main reason I bring this up is from previous meetings this was -- this was a hot topic.

**DR. ULSH:** Yes.

**DR. MAURO:** And the degree which we could really run this to ground to the point where the petitioner would feel convinced that yes, in fact your answers are -- make sense. I --

I want to just bring our attention to this one item because I know it's sensitive.

**MR. GRIFFON:** Yeah, I've heard exactly (unintelligible) John, because it most definitely is.

**DR. ULSH:** So the action item is to show a few examples where this occurred, or the cases we're presenting it actually is true.

**MR. GRIFFON:** Track specific examples where (unintelligible)

**DR. ULSH:** Okay. I'm looking at my guys and I think we can do that but I think Arjun has --

**DR. MAKHIJANI:** Yeah, I have a little bit of -- of a question on this. I think the explanation that you've given in terms of somebody not handing their badge in because they were sick or not there that day and the badge being read in the next cycle probably applied to many of these cases. But the difficulty here is given the allegation that along with affidavits and specific examples and in one case specific numbers of radiation fields, the -- the problem is to show that it was only the truly odd exception that you could deal with on an individual dose reconstruction, that this

wasn't -- that there isn't a systemic problem of fabrication. I think through the petition and the affidavits there's a suggestion of fabrication and I'm wondering -- that's the -- so this is -- this is probably a problem and this procedure is a good way to deal with it and I don't have a problem with that. It's -- It's knowing that the zero or blank record have all characterized or most -- almost all characterized with this. That's, I think, a little bit more difficult.

**DR. ULSH:** Well, the fabrication issue is dealt with in a later comment.

**DR. MAKHIJANI:** All right.

**DR. ULSH:** How about if we revisit that after we've --

**DR. MAKHIJANI:** Sure.

**DR. ULSH:** -- talked about that and see if there's still -- So that's the explanation at least that we're providing. The action item is for us to show some examples of this. Okay. Comment number 2. This deals with an allegation by or insertion let's say by the petitioner that tips fell out of the TLD's and readings were not included in workers' records.

And they go on to say that they fell on the floor and were lost and were hence never read. This is an affidavit that was in the petition and it was related in this -- this comment here. In our response we say that it is possible that these crystals were read before they were dropped. However, it is also possible that they were dropped before they were read. Now, the -- the question is what do you do in that case. And if you look at page 4 of the handout there's a diagram. Jim referred to this earlier. It shows the TLD system at Rocky Flats and what you'll notice is that there are duplicate chips. There are, for example, two TLD 600s. There are two TLD 700s. If one of those chips was lost, as sometimes happened, the dose could be reconstructed, could be read from the remaining chips. So, yes, it is possible that some chips were lost. However, this does not prevent the badge from being read. So that's our response on that.

**MS. MUNN:** Is that okay?

**DR. ULSH:** So Mark, where do we go with this item? Is it --

**MR. GRIFFON:** Yeah, I mean we're just seeing

these responses today so --

**DR. ULSH:** Well, I understand.

**MR. GRIFFON:** Yeah. I would say that it certainly (unintelligible) your response. But --

**DR. ULSH:** Could we put that NIOSH has responded and someone will review?

**MR. GRIFFON:** Yeah, NIOSH has responded -- you provided a response. And the action (unintelligible) NIOSH from this standpoint (unintelligible)

**DR. ULSH:** Comment number 3, it says hair and body oils on the TLD chips cause inaccurate readings. I would agree. When you had contamination on the crystals it could result in anomalously high readings. That is certainly true. Again, when there is a suspect reading on a -- on an individual chip we have duplicate chips. And so I would answer it very much the same way as I did the previous one and that is that we could use the other remaining chips to get a dose estimate from that badge.

**MR. GRIFFON:** The only thing I -- I would say if this comment is true is you are referencing these procedures quite often it seems.

**DR. ULSH:** Yeah, there's a lot --

**MR. GRIFFON:** It might be useful to reference the older ones as well. You can say it wasn't formal but there were existing practices for that.

**DR. ULSH:** Okay. We can do that.

**MR. GRIFFON:** But to demonstrate that it wasn't merely post-1989.

**DR. ULSH:** Sure. As Jim mentioned, the Link and Pennock reference from 1983 won't have the level of detail that the later one did but we can reference both of them.

**MR. GRIFFON:** Right.

**DR. ULSH:** Sure.

**DR. MAURO:** I got a question that links what we're talking about now back to the no data available.

**DR. ULSH:** Okay.

**DR. MAURO:** According to the no data available there were two times when that would be inserting in a person's record, two conditions. One was when the badge was not returned, okay; and the other was when you got a problem with the dosimeter badge. Now -- But I -- Now, I just heard, though, that there were provisions.

The badge had multiple elements so that really you should not have a circumstance where you would get a no data available because of a problem with the badge. But when you say a problem with the badge that means the entire badge? I mean something -- something -- In other words, you didn't just lose an element. You -- You -- Something was wrong with all of the elements on the entire badge and it was just unusable?

**DR. ULSH:** No, that's not really what I'm saying. Jim, do you want to --

**MR. LANGSTED:** Well, John, you could have everything from, you know, one crystal alone that was resolved on the spot, to multiple crystals that was fairly complex and would have to go to the professional dosimetrists to look at. And in the dosimetry shop where you were trying to turn the results around, you know, like on the two-weekly badges, you were trying to turn those results around and get them back down. Meanwhile the monthlies were sitting there ready to read and the quarterlies were, too. Sometimes the final report would be run even though the dosimetrist hadn't worked out

those details yet. And if it required, for instance, going to the supervisor or going to the employee to find out what they were doing and who else was working with them to do a -- a co-worker analysis, so it sometimes was the case where it would take awhile to get resolved.

**DR. MAURO:** And this was the fault of dealing with this aberrant situation where you are trying to keep your records?

**MR. LANGSTED:** Right. Yeah, you wanted to get the report done and back down to the supervisor so he could manage his group. And it was frustrating from the employee standpoint because they would see no current data available; wait a minute, I turned in this badge. And so -- and the follow-up was definitely not perfect so the employee may never have heard what the final result was.

**DR. MAURO:** This is a badge management problem as opposed to this other issue where you have these elements that just were happening due to fallout.

**MR. LANGSTED:** Correct.

**DR. MAURO:** And you had a backup situation to

deal with that?

**MR. LANGSTED:** Yeah, yeah.

**DR. MAURO:** So that's the distinction. I understand.

**MR. LANGSTED:** But the backup may sometimes have taken long enough that, you know, the report went, you know. Finally somebody would make the decision, go ahead and run the report and the -- the five that weren't in there or the one that wasn't in there went in as no data available.

**DR. MAURO:** I understand. Thank you.

**DR. NETON:** I just had a quick question.

**MR. ELLIOTT**: Is it fair to say that a better descriptor of this kind of event -- I guess I've seen at other facilities, INEL one -- is result under investigation. I've seen that entry. Would that be -- have been a better descriptor for this kind of occurrence?

**MR. LANGSTED:** In some cases, although in many cases the situation was that the badge had not been exchanged so -- and as we discussed, Rocky Flats did not have a tight exchange program. And if a worker did not exchange their badge on the board --

**DR. NETON:** I just had a quick question. At any time did Rocky Flats initiate glow curve analysis capability at all so that you could -- you could clearly differentiate these -- these phosphate detergent bars and chemical burns from the TLD's?

**MR. LANGSTED:** Yeah, when the -- when the Panasonic system came in in 1989 you had glow curve --

**DR. NETON:** And that would clearly be part of the --

**MR. LANGSTED:** -- investigation.

**DR. NETON:** -- investigation.

**MR. LANGSTED:** Exactly.

**DR. NETON:** And that would -- that's proof positive at that point --

**MR. LANGSTED:** Right.

**DR. NETON:** -- that this was not a result of a radiation luminescence as opposed to a chemical.

**MR. LANGSTED:** Right. You would look at the glow curve and could see the issue.

**MR. GRIFFON:** All right. That's essentially it then.

**DR. ULSH:** Okay. That's -- That's comment

number 3 about the contaminants on the chip. Whatever designation we're using to mean that NIOSH has turned in a response and, I don't know, you, Mark, or someone's reviewing it.

**MR. GRIFFON:** Yeah, I mean I'm keeping track. I'm keeping track of these.

**DR. ULSH:** Okay.

**MR. GRIFFON:** I would say the only outstanding action item is that NIOSH will provide other -- other historical QC references.

**DR. ULSH:** Oh, are you talking about the Link and Pennock reference?

**MR. GRIFFON:** Yeah.

**DR. ULSH:** Okay.

**MR. GRIFFON:** I mean that's '83 so it's --

**DR. ULSH:** That's on the O drive, Link and Pennock is on the O drive.

**MR. GRIFFON:** Yeah. But also that's 1983 so if there's anything -- if it goes back further that would be more helpful. But other than that I would say that response is complete by NIOSH.

**DR. ULSH:** So you're looking for an earlier reference than the '83 Link and Pennock?

**MS. MUNN:** I think he's asking whether there is

one.

**MR. GRIFFON:** As best you can, find proof that this practice went -- went back through the program.

**DR. ULSH:** We'll take a look, Mark.

**MR. GRIFFON:** Yeah.

**DR. ULSH:** I'm not aware of any yet but we'll take a look. Okay. Comment number 4. This is the assertion that deliberately false entries were made into dose records. And the comment reads, there's a deliberate falsification of data. For instance a worker alleges that a supervisor would advise the dosimeter worker that the dose shown was too high to possibly be correct, and the worker was advised to change or delete the reading. Further in -- further on in the petition, the worker alleges that zeros were entered into dose records when TLD -- when the TLD reader failed. Okay, our response to this is that both of the situations described in the comment, that is, a worker was advised to correct an anomalously high dosimeter reading; and the second is that a zero was entered into the dose records when a TLD reader failed. Those are both plausible

situations that very well could have occurred. However we contend that that does not necessarily constitute deliberate fraud. That's a very serious charge and we've presented -- you're going to notice a lot of the language here is similar between comment responses. That's deliberate. I did that on purpose. There are certainly other explanations and those include what we've talked about; that suspect dosimetry readings were investigated and the conclusion of that investigation could have been that a lower reading was inserted. Now, I would also mention that the Rocky Flats dosimetry program was similar to the dosimetry program at other DOE sites. It was subjected to a number of audits and inspections over the years and that includes both within the contractor organization and outside the contractor organization. We are not currently aware of any findings of systematic fraud. And this is a very serious charge so I would expect that it certainly wouldn't be buried. We have followed up. This ties in with the letter that we sent to the petitioner on March 15th and that

Jennifer said the response is on the way. Once we get that letter we will consider it very seriously and look at any of the reports to see if there's evidence of systematic fraud. So I guess the action item, Mark, should be that NIOSH will review the --

**MR. GRIFFON:** Petitioner's response.

**DR. ULSH:** Exactly. Okay. The next comment is comment number 5 and that is that the petition provides examples of unauthorized work practices, and it says that the data integrity implications of this are unclear. The response -- I took a look at the page that was referenced here and it deals with what the petition called furtive job tasks. In other words, jobs that were performed, and this is a quote, "outside the bounds of normal work controls with no airborne contamination monitoring and with no special worker monitoring." This is a situation where I think we need to differentiate between a regulatory compliance violation and a situation that would prevent NIOSH from doing sufficiently accurate dose reconstructions. If the furtive -- okay, I don't want to say if. These furtive job

tasks, which could certainly represent a compliance violation; we're not contending that. But if they were wearing dosimetry we could estimate the doses. So I don't really see, if you grant that these situations occurred, I don't see how that necessarily constitutes an SEC issue. And no evidence is really provided at this point in the petition that would say that NIOSH could not estimate doses even from these furtive job tasks.

**MR. GRIFFON:** I think that completes -- Other opinions?

**DR. ULSH:** I think you're about to hear one.

**DR. MAKHIJANI:** I think the TLD piece of it does address the external dose.

**MR. GRIFFON:** Arjun, can you (unintelligible)

**DR. ULSH:** Maybe that's not plugged in.

**DR. MAKHIJANI:** The -- The TLD piece of Brant's response does -- does -- does address the external dose question in these non-compliant or potentially non-compliant work practices. But there's also the question of the internal dose and those special bioassays. I don't know what the full radionuclide list is.

**DR. ULSH:** Okay. My response to that side of it would be very similar. Presumably radiation workers were on routine bioassay programs and so that would be picked up on -- in routine bioassay. In fact, there's an example later on in these comments of exactly that. Whether an intake resulted from a furtive job task or from a normal job task it should show up in a routine bioassay. Now, the problem might be an intake might not be immediately recognized as having happened. For instance one of these furtive job tasks occurred and six months later there was a positive bioassay. It is true that we may not be able to pin this event on this specific incident or a specific job task. However, we have procedures in place by assuming a chronic intake that we would provide a claimant favorable -- claimant favorable estimate from that positive bioassay. So I think the argument is the same for both sides. Assuming that they were monitored that's an integrated measure.

**DR. MAKHIJANI:** This is a clarification since -- since I've been through the petition and put this list together. The -- My purpose in

putting the list together was to try to compile everything that relates to data integrity and leave it to you to characterize what may or may not be an SEC issue. I wasn't -- I didn't view my job as putting an SEC screen through this list. I viewed my job as simply putting all the data integrity issues on the table as best I could see them. It is a 700-page-odd petition so this was -- this was not -- I can't, you know -- I did the best I could.

**DR. ULSH:** Okay. So I think that's our response for this comment, that we don't -- NIOSH at least doesn't see this really as an SEC issue. Mark, I don't know where you want to put it in terms of the stage of resolution that we are with this.

**MR. GRIFFON:** I think you're complete as far as the response, okay?

**MS. MUNN:** Especially --

**MR. GRIFFON:** I tend to think you're correct that it doesn't seem like an SEC issue.

**MS. MUNN:** Especially for this particular claimant. Radiation control technicians do in fact have specialized training and if anyone is sensitive to the need for badging requirements,

it should be a radiation control technician.

**DR. ULSH:** Okay. The next comment, comment number 6 found on page 8 has to do with inappropriate subtraction of background in badges. An example is, let’s see. The petition claims that there are systematic errors for some workers caused by subtracting too high of a background. This is an issue that we investigated early on and it’s somewhat mysterious to us. In order to evaluate this issue we initiated a records review and we looked at approximately 18 boxes of external dosimetry records and those included weekly and monthly status reports from the ’50s, ’60s, and ’70s and some technical documents generated during that period. There was about 500 pages. We didn’t find any evidence -- I don't know, there sure seems to be some interference. I don't think it’s coming from me but -- We didn’t find any evidence of an elevated background problem. And in fact, we talked to four retired dosimetry program managers and none of them could recall this issue either. In worst case what would be required --

**UNIDENTIFIED:** Hello?

**DR. ULSH:** Hello?

**MS. MUNN:** Hello?

**(unintelligible)**

**MS. MUNN:** Who are you and what are you saying?

**DR. WADE:** There's a background discussion going on that we can hear.

**(unintelligible)**

**MS. MUNN:** They don't care.

**DR. WADE:** Okay. We're picking up a background discussion.

**(unintelligible)**

**DR. WADE:** Okay. Let's continue.

**DR. ULSH:** Okay. In the worst case, even though we've not found any evidence of this problem, but if -- if it did in fact occur, what would be required is that we would adjust the ambient environmental dose that we assign during dose reconstruction. So we don't see this really as an issue that would preclude us from doing sufficiently accurate dose reconstruction but I understand, Arjun, that you're just putting everything on the list. So NIOSH contends that we wouldn't classify this as an SEC issue.

**MR. GRIFFON:** But is this a question of having

the -- the -- the badges, the control badges hung in like a hot area or a (unintelligible) hot area rather than in a -- in an actual controlled area? Is that the issue they're bringing up here?

**DR. ULSH:** You do see at the top of page 8, Mark, there are two bullets and it says workers in the building who were not in the back area were receiving unmonitored dose just like the dosimeters on the board. So it could be.

**MR. GRIFFON:** Yeah. Okay.

**MR. BUCHANAN:** Yeah, this is Ron. I think what they're talking about there is the scale (unintelligible) if you hang the control dosimeter outside the work area and then (unintelligible) and then track that off from the (unintelligible) corporate badge then they're getting cheated on their dose.

**MR. GRIFFON:** Right.

**MR. BUCHANAN:** But the control badges (unintelligible) put in a background area not subject to any radiation handling issues (unintelligible)

**MR. GRIFFON:** I don't see -- I don't see it relevant to environmental -- environmental

exposure, to ambient exposure. I mean this is more of a -- I mean that's my statement is what Ron said, this question of how to control -- placed too close to the workplace or too close a proximity to the high exposure areas or higher exposure areas.

**DR. ULSH**: Right.

**MR. GRIFFON:** And therefore you're tracking out more than you should when you're reading. And that's the allegation I guess.

**MR. BUCHANAN:** (unintelligible)

**MR. LANGSTED:** The research demonstrates that the control badges were not hung with the boards. The control badges in fact were kept in the dosimetry lab and so the fact that that the board may have been in a high background area would have added additional dose to the workers, not subtracted dose via the control badge.

**MR. GRIFFON:** Okay. So you're saying the control -- okay. So that (unintelligible)

**MR. LANGSTED:** Yeah, that's what all this research that was done looking through the boxes and interviewing the -- the managers was to try to determine if in fact the control

badges were there, and the conclusion was, no, they were no.

**MR. GRIFFON:** Okay.

**DR. ULSH:** I could have made that clearer in my response. I apologize for that. Okay.

**MR. GRIFFON:** That's okay. I'm reading as I'm listening, too, so it's kind of -- okay.

**DR. ULSH:** Are we -- Are we ready to move on to comment number 7, Mark?

**MR. GRIFFON:** Yeah.

**DR. ULSH:** Okay. That's found at the bottom of page 8. The comment deals with workers frequently did not wear badges in production area and did not report non-use of the badge. The comment says that this raises the question of how missed dose is to be interpreted. All right. The response is that in a situation where such a practice is alleged -- alleged or suspected we have methods to adjust the recorded dose appropriately. The reference that I would provide here is the External Imp. Guide where we talk about the nearby technique where we can extrapolate from a worker's adjacent monitoring periods. Alternatively we could treat that particular badge reading as

suspect, not reliable, and essentially consider the worker to be unmonitored during that period, and we could apply co-worker data, whichever is more claimant favorable, to use the actual badge reading or to use the co-worker approach. Either way I think we've got a bounding technique here for dose reconstruction so I think this might also be a situation where NIOSH would contend that this does not prevent us from doing sufficiently accurate dose reconstructions.

**MS. THOMPSON**: This is Jennifer. Can I interject something?

**DR. ULSH:** Sure.

**MS. THOMPSON:** That assumes that you know that the worker went in without his badge. That assumes the worker remembers every single time he ever went in without his badge and reported diligently that he did that. And that's not the case.

**DR. ULSH:** That -- That could very well be true. I don't know how we would identify situations if --

**MS. THOMPSON:** It seems many of your answers assume that procedures were followed 100

percent -- 100 percent of the time. That also is not the case.

**DR. ULSH:** No, I certainly wouldn't -- wouldn't contend that procedures were followed 100 percent of the time. There are clear examples where they weren't followed. But my contention is that they wouldn't prevent us from doing adequate dose reconstructions. Now, in terms of how could we identify a situation where this might have occurred, we can look at populations of data certainly and -- and see where there's a tailing off. So in other words, as workers approach the administrative limits in place at the time, what you'll see is that the recorded doses sometimes tail off. Now, there could be two explanations for that. One is that they were approaching the limits and they were -- they were restricted from radiation work. The other is that their badge didn't enter the radiation area. In other words, they were left in the locker which is what the contention is. We do have methods to identify situations like that and I think we would rely on those techniques in addition to situations where this was alleged by the worker. In terms of could

this ever have occurred and could we detect it in all situations, I think the answer has got to be no. I don’t -- I don’t think that we could. So this might be an issue for the Board to decide based on this.

**MR. GRIFFON:** And again it’s a question of -- of how frequent the practice was. I mean we -- we have the (unintelligible). But it, you know, it’s very difficult, especially when, number one, your question here doesn’t ask whether anyone didn’t wear a badge, you know. And -- But then secondly, it involves survivors that are -- that are going through this process so they -- you wouldn’t -- you would never have that (unintelligible) obligation in that case. So, you know, I agree that there’s concern here on how this could be used or applied.

**MR. PRESLEY:** How many cases do we have in this -- in this category? Did you catch that, Mark?

**MR. GRIFFON:** I can hardly hear you, Bob.

**MR. PRESLEY:** My question was how many cases do we have in that category.

**MR. GRIFFON:** That’s what I’m saying. I don't know that we know. I mean I don't know how,

you know -- if that's what we're saying, how can -- how can you identify the cases? One is -- Brant just described the -- the methods but it -- it could be that you have real effective controls on the one hand. Or any time they approached their limit they left their badge in the locker is the other possible explanation so they could keep working. And, you know, my -- my concern is if you just wait on a claimant to allege that, they generally say that they don't remember when they did those specific, you know, when they did it. And number two, they may not be living or -- or, you know, there may be a survivor situation.

**MS. THOMPSON:** Mark, another thing is the fact that the workers are fairly smart, and if they worked in an area where they know it's high rad, they're not going to wait for the end to leave their badge in their locker. They're going to wear it every third day.

**MR. GRIFFON:** Right.

**MS. THOMPSON:** You know these people. They're -- They're relatively intelligent people.

**MR. GRIFFON:** But do you -- do you -- Jennifer, do you know certain departments where they knew

that, you know, they didn't want to get shifted out of a certain department because the -- the alternative was a worse option for work? I mean I've heard that several times where I've been that -- that people would do this practice because they didn't want to get shifted to another building where it was going to be, you know, a much harder job, much hotter environment, whatever, you know. A hot -- I talking about temperature hot, you know.

**MS. THOMPSON:** Yeah. You actually have several factors that come into play. You know, you have a hot area, say, and so you've got paid for to work in the environment in which you were known to receive radiation exposure so there's a financial incentive to be able to stay in that area. In addition, there is more overtime -- historically has been more overtime given in areas that have the higher rad work and so if you get opted out you can lose a lot of money in overtime pay. So people generally didn't want to get transferred to the cold side because of financial reasons.

**MR. GRIFFON:** Right.

**DR. ULSH:** One thing I would point out is that

--

**MR. GRIFFON:** (unintelligible) hot (unintelligible) narrow it down that much.

**DR. ULSH:** One thing that I would point out is that after 1964 the TLD or the dosimetry badge was incorporated with the security badge so I don't know that you would have access to these areas if you weren’t wearing your badge. Now, before that --

**MR. GRIFFON:** Although access to the area, would that necessarily mean they wore it right to their work stations?

**MS. THOMPSON:** Yeah. Absolutely not. Your -- You only had to have your badge to get in through the outer security gates, not into like, say unless you’re (unintelligible) access area.

**MS. MUNN:** Oh, my.

**MS. THOMPSON:** That was (unintelligible), you know, actually where they separated the dosimeter badge from the security badge, it was security became more strict. And so having them together in the later years your statement would be correct.

**DR. ULSH:** Okay. I don't think that at the end

of the day NIOSH is going to be able to say with any certainty that when workers deliberately suppressed the readings on the dosimetry badge that we would have a method to correct that -- to catch that in every case. I think that's -- you can always come up with a hypothesis, a scenario where we wouldn't catch it. So --

**MS. MUNN:** Especially if --

**MR. GRIFFON:** I mean I'm not trying to --

**MS. MUNN**: -- the workers were complicit.

**MR. GRIFFON**: -- the frequency with which that practice occurred.

**DR. NETON:** Deliberate workers (unintelligible)

**MS. MUNN:** No. When the worker is complicit in the use then --

**DR. ULSH:** So at the end of the day that's where that leaves us. And I think the Board has to decide whether they want to consider this situation to be an SEC issue. I don't know that, Mark, that we're going to be able to get a handle on how often this was done, given the workers' reluctance to talk about it or even maybe their inability to remember when it happened. We do have methods in place to catch

it in I contend a great number of cases. Can I tell you that we could catch it all the time? No. I can't say that.

**MR. FITZGERALD:** Could I -- Could I just --

**MR. GRIFFON:** Jennifer? Jennifer, do you know of -- of individuals that are in the petitioner group that have -- that have more specific examples of when, where? I know that's difficult.

**MS. THOMPSON:** You know, and I apologize for -- for not remembering but there is a woman from (unintelligible) and Associates that's in town in Denver right now and I believe she's talking to some of the -- the workers about types of issues. And she may be gaining testimony or information that would further elaborate on this right now. I know she's been meeting with several people in the last couple days.

**MR. FITZGERALD:** Yeah, Mark. This is Joe.

**MR. GRIFFON:** (unintelligible)

**MR. FITZGERALD:** Yeah, just -- just to clarify for those around the table that don't understand what's going on. We have Kathy Robertson-Demers pursuing the issue we raised in Boston which is trying to find some

substantiation beyond the anecdotes and the allegations, just see if there's anything more concrete that might shed some light on this. And that's what she's doing this week in Denver which is talking to workers, see if there's any corroborating information that we haven't seen so far and to try to add that to the discussions and we'll see what we get. We haven't talked to her yet.

**MR. GRIFFON:** Brant, I think that where I'll leave this is that, you know, NIOSH has completed the action but we'll leave the item open as opposed to -- I think several of the other ones we sort of projected that they're not SEC. I think this might be (unintelligible) here pending some of, you know, further specific information if it's available.

**DR. ULSH:** Yeah, I think that's probably appropriate and I think we've provided as much as we really will be able to.

**MR. GRIFFON:** Right.

**DR. MAKHIJANI:** Mark, could I make a correction for the record? This is a minor item compared to -- It says here, the citation in the

comment appears to be in error. I don't think it is in error. I've got the petition open. I just -- it's not a quotation from the petition. It was a paraphrase. The petition words are (reading) workers also frequently forgot to wear their dosimeters into the production areas and most would not self-report so doses went unreported. So it -- it was something of a paraphrase but --

**DR. ULSH:** Okay. I think it caught the spirit of it. I'll take it back.

**DR. MAURO:** This is John Mauro, Brant. You had mentioned, though, that you do have a way to not catch them all but to identify occasions where either it was inadvertent or deliberate where the badge did not go with the person. Now, what I'm hearing, this is a recurring issue. That is, on many occasions we encounter allegations that -- of deliberately not bringing the badge with you for -- for financial reasons that had implications. Now -- But I heard you say something very important, that by reviewing the records there are times when you could discern that there -- there's something about the pattern of

exposures that would lead you to believe that here we might have a -- a reporting period where the badge did not go with the person. Am I correct that -- that -- that you have a way to -- now, it seems to me that without making a judgment regarding whether it was deliberate or inadvertent, if a sample of records were to be reviewed and you were to use the methodology you described, we could start to get a sense of the prevalence of this type of pattern. And because to me the big -- the bigger question is is it -- is this a widespread issue or not. And I guess to the extent to which there's some metric that could somehow reveal how widespread this is or -- or not, it would be very helpful to not only address the issue as we're encountering it here but as we have encountered it at other -- other petitions and site profiles. Is this something that's doable, reasonable?

**DR. NETON:** I'll take -- I'll take a crack at that. I think it is something that is doable. How soon it could be done is another question. I mean, you know, these -- these type of analyses take time. We'd have to pull up the

data. I guess, you know, we could -- we could take a quick look at the -- this would only affect workers with fairly significant exposures.

**DR. MAURO:** Uh-huh.

**DR. NETON:** And our evaluation of records, particularly in the more recent years, there's very few workers that approach the limits. Now, maybe in the very early years when doses were not as well controlled we might have more issues like that but we could look at the tail-off of the cumulative dose on a worker by worker basis to see how many -- how many workers that may have affected. In other words, as -- as the worker approaches the limit does his exposure tail off dramatically at the end which would indicate that the badges were left in the lockers or whatever.

**DR. ULSH:** Or that they were pulled out.

**DR. NETON:** Or that they were pulled out. It could be either situation but it would give you a handle on the extent of the potential problem as you suggested.

**DR. MAURO:** That's what I'm looking for, the extent.

**DR. NETON:** We could take a look at that but I couldn't promise that this would be done in -- in a couple weeks. That's -- That's the -- as far as I can comment.

**MR. GRIFFON:** I think can you give us a -- I'm not sure how to leave that. I think that would be useful, Jim, but --

**DR. NETON:** Well, I guess --

**MR. GRIFFON:** Again the extent of -- of how much work has to be done.

**DR. NETON:** Well, I think that, you know, if -- if we leave this as an open item and -- and we -- we list it as one of the potential avenues to pursue we could come back with a better --

**MR. GRIFFON:** Give an update on what you find, yeah.

**DR. NETON:** Yeah, after looking -- looking at it. And -- And, you know, I'm guessing that it would be possible but oftentimes I'm a pretty bad prognosticator.

**DR. WADE:** And again we're going to move into an SEC phase so NIOSH could consider whether to produce such evidence and provide it in the evaluation report or bring it to its presentation at the April meeting.

**DR. ULSH:** I can almost guarantee that we will not be able to get it into the evaluation report because that's due to come out within the next week or -- week or so.

**DR. WADE:** So again you can consider whether or not you want to bring such evidence to the -- to -- to inform the discussion at the end of April.

**DR. NETON:** Right. It sounds like SC&A is pursuing this issue from a different attack with the interviews of workers and so it seems like this will be fleshed out in -- in greater detail in the near term.

**MR. GRIFFON:** Yeah.

**DR. NETON:** And we'll -- I think we should just leave this one path open and look at the tailing as a possibility, as one of the alternatives and if we can fit it in, we will. But if we can't maybe the weight of the evidence on the other issues will -- will help.

**MR. FITZGERALD:** Just to -- Just to add a little bit to what we're doing this week, it's really to get a handle on what John was talking about. Whether or not we could provide any substantiation this is systemic and pervasive,

not to get more, you know, individual testimonies or affidavits or data items. That's not going to, I think, move us forward. It's to really determine if there's some evidence that this -- this pervades perhaps the operational history and see if there's any documentation to support that.

**DR. NETON:** And of course, this would not be informative at all for the workers who -- who assert that they just forgot to wear their badges. That -- That would be independent of the cumulative dose. I would suspect so unless they forgot is a euphemism for didn't wear it because they were approaching the limit.

**MR. GRIFFON:** Jim, would this database data, does it have every badge cycle on it or is it --

**DR. NETON:** Yeah, that's a good question. I think with Rocky we've got situations where we only have --

**UNIDENTIFIED:** Quarterly.

**DR. NETON:** -- quarter -- quarterly data?

**UNIDENTIFIED:** Yeah.

**DR. NETON:** Yeah. See, we've -- we've attempted to investigate this at the Hanford

facility where we had weekly data. It's -- It's a -- It, you know, provides for a better analysis so again that's why I'm -- I'm reluctant to say that we can do it for Rocky. We need to take a look and see what -- what can and can't be done.

**MR. GRIFFON:** Right.

**DR. NETON:** Right. You know, it may be that it can't be done.

**DR. WADE:** And this sort of raises a generic process issue -- this is Lew Wade -- that I'd like to talk about a little bit. Again, the Board is going to be sitting with the petition evaluation report in front of it at the end of April and there will be a great deal of pressure on the Board to make a decision at that point. It doesn't mean the Board has to make a decision but there'll be a great deal of pressure. So I think that all of you involved in this process, as you uncover information, I think it would be incumbent on you to share it with the Board as quickly as possible, not to wait until that April meeting so that the Board can have the opportunity of sort of mulling through these things, each individual Board

member in their own way as they come to the Denver meeting and decide upon this issue. So again, if we find things from the Demers interviews then we need to be providing them to the Board as quickly as reasonable.

**DR. ULSH:** Okay. Unless anything --

**MR. GRIFFON:** We're on to item 8 then.

**DR. ULSH:** Yes, okay, item 8, good. This comment raises three issues as I count them. The first has to do with geometry. Would a badge accurately -- could a badge result accurately be used to calculate doses for readings that weren't close to the badge. That's issue number one. Issue number two is lead aprons and what effect that might have. And issue number three is what effect might all this have on co-worker data. So let me just walk through those. First of all, it's not clear to us how a badge could not be used to calculate doses to organs far from the badge. And an example of NIOSH's approach for -- for doing this is our glovebox worker TIB where we have badge results in for organs in the lower abdominal -- lower abdominal area. We make an adjustment based on geometry. So we agree that

this issue needs to be considered and an adjustment needs to be made; we contend that we can do that and we are doing that. With respect to lead aprons, there's a question about were the badges were worn under the lead aprons or over the lead aprons, and that -- that changed throughout time at Rocky Flats, the instructions on that. Lead aprons were available for -- for limited use at Rocky Flats and for most years they were instructed to wear the badges under the lead apron. And in 1992 that was changed to instruct the workers to wear the dosimeters outside the lead apron. Now, the issue here is if I'm wearing my badge underneath my lead apron and I get a cancer in an exposed part of my body, say for instance the esophagus, how can we estimate doses for those organs that weren't covered by the lead apron? Well, as it turns out there were field studies performed to determine dosimeter responses in both locations of the film badge, under the lead apron and over the lead apron. And I recall the details for -- for Pantex. I -- Jim, you maybe can correct me about Rocky Flats but I think that if you're wearing the

badge under the lead apron the -- the recorded dose was just reduced by a factor of somewhere in the area of 20/30 percent.

**MR. LANGSTED:** I don't recall what that number was right off but yeah, there was a measurement done specifically for that.

**DR. ULSH:** So I -- I would put this into the category -- I really like John's term of a tractable issue. An adjustment does need to be made and it can be done. It's not -- It's not one of these issues where we can't estimate the effect of -- of lead aprons. Now, I think Arjun wants to (unintelligible)

**DR. MAKHIJANI:** Brant, would that -- would that not cut off the shallow dose altogether?

**DR. ULSH:** Yes, it seems like it would. So where do you go from there?

**DR. MAURO:** So to make it tractable you'd have to have some knowledge on the -- the energy spectrum to which the shielded badge is being exposed to? Then -- Then -- Then we have a tractable issue. I guess that's what -- and -- and is it reasonable to assume that you would have that information?

**MR. LANGSTED:** Yeah, we should be able to get

skin to penetrating dose ratios from co-workers to look at --

**DR. MAURO:** Okay.

**MR. LANGSTED:** -- in a case like that. You know, this would -- you know, if there were like Brant said a lead apron issue with a cancer outside, that would take some special dose reconstruction outside of the normal process.

**DR. ULSH:** Now, the -- the other issue, the question that was raised in the comment -- would you want to chip in? I think that -- was that Mark?

**MR. GRIFFON:** Nope, I didn't have anything.

**DR. ULSH:** Okay. The other question that was raised in the comment is how would this impact on co-worker data. And I think if you give some thought to how we do co-worker data I think the conclusion you can come to is that it wouldn't affect it because what we do when we assign co-worker data, we use co-worker data to get whole body doses to assign to an unmonitored individual. Once that assignment has been made for a whole body dose we then go on and apply dose -- dose conversion factor,

organ specific dose conversion factors. So I don't think that this would have implications for the co-worker data.

**DR. MAKHIJANI:** If -- If the lead apron problem was there for most of the time or much of the time, then how do you estimate the co-worker doses for -- for the shallow dose? Because the whole body dose is not going to give you that number unless you have an explicit study for the inside the apron and outside the apron when the shallow dose recorded and comparable radionuclide situations like, you know, the americium percentages controlled and so on. You wouldn’t know what to do.

**DR. ULSH:** Keep in mind that lead aprons were used on a very limited basis so when we’re talking about co-worker data, the impact that that might have on the entire data set I think would be pretty small. And as Jim mentioned earlier we could use co-worker data to get the ratios of penetrating to shallow dose and apply those to the individual. I think, Jim, do you want to --

**DR. NETON:** Well, I -- I just have a question

really to Jim's comment that your recollection was that the difference was on the order of only 30 percent?

**(unintelligible)**

**UNIDENTIFIED:** I don't recall.

**DR. NETON:** It seems to me that if Rocky were wearing lead aprons it was mostly in response to protection to (unintelligible) of photons, things like plutonium. And I would suspect that a lead apron would have a much larger correction factor than -- than about 30 percent. So I think the answer is we would know what the correction factor would be and -- and the low energy dose, the shallow dose would be relevant to the 17 keV (unintelligible) which would be applied. So I think we have a handle on that unless you've got a unique situation where there are pure beta particles which, you know, I'm not sure there are that many at Rocky Flats. I think that the issue can be dealt with with these geometric correction factors for apron usage. I would have to look at the study but I would suspect that they -- they evaluated it, you know, 17 keV exposure with and without the lead aprons.

So we -- we need to take a look at that and maybe get that report back on -- on how that would be dealt with.

**MS. THOMPSON:** This is Jennifer. I'd like to provide clarification. Somebody said that lead aprons were used on a very narrow basis at Rocky Flats and I know that -- that site profile didn't include analysis of more recent operations at the site. But many of the rescue processing operations where we were doing the repackaging on 106 metric tons of residue at Rocky Flats involved the use of lead aprons. And so, you know, that needs to be reflected in -- in whatever -- whatever you think you can do to adjust for that.

**DR. NETON:** Jennifer, what time period was that?

**MS. THOMPSON:** 1995 to the end of probably 2003.

**DR. NETON:** Right. I think the response indicated that the lead aprons -- or the badge was worn outside the lead apron after 1990-something.

**MS. THOMPSON:** But the response was that the procedure required it to be worn outside but

many people still wore it under because they had always done it that way. And just because a procedure was changed doesn't mean actual practice changed.

**DR. NETON:** Okay.

**MR. BUCHANAN:** This is Ron. At the Pantex plant for '95 (unintelligible) had an overall reduction in photon dose of 57 percent and the neutrons I want to say (unintelligible) percent. And so the neutron dose (unintelligible) of course but (unintelligible)

**MR. DEMAIORI:** This is Tony DeMaiori with the Steel Workers. I have Jerry Harden with me. And I apologize to you. We were working with Kathy Demers going through our records. I'd like Jerry to speak on what I brought up in the last Board meeting about people not wearing their dosimeters and the people putting their dosimeters on -- on high dose material to verify the -- well, basically the dosimetry program. So I'm going to turn this over to Jerry right now. Thank you very much. Jerry?

**MR. HARDEN:** What is it that you want to know from me?

**MR. GRIFFON:** Well, we're going back in action

items that we already discussed I think but the -- the question was -- that has come up in the petition, we referred that at least some workers have alleged they might have left their badge outside of areas and worked in hot areas for -- or as Tony just said, might have even put their badge in a hot drum of some sort to -- to sort of test the program to see if they were actually measuring doses. We were looking for specific examples of where that might have happened or how frequently.

**MR. HARDEN:** I don't know about the frequency. I know one specific case that occurred in the late ’60s. A deceased worker named O.G. Fergus (ph). And let me explain the motive why a lot of people would attempt to do what we’re talking about today. It was about the money, honey, or they might lose their shift or their various other motivators. And with Fergus, he was rotated out 774 building, which was a parking lot for -- for high dose workers and moved into 71 building. So he assumed if he put his badge on a -- a can of oxide that that would load his badge and consequently elevate his numbers where he would be reassigned back

where he wanted to be. And I can't name all the people that I suspect might have been involved in either, you know, skewing the data, you know, less that it ought to be or more, but I -- I do know that case to be a valid one.

**MR. GRIFFON:** And in that case he wanted to go back into the --

**MR. HARDEN:** From 71 building production back into the 74 building.

**MR. GRIFFON:** But he was trying to back out of... Well, thank you.

**MR. HARDEN:** And that's all?

**MR. GRIFFON:** Well, that's the main thing I needed. If there's any other specifics you can give and -- and more so you mentioned the money incentive.

**MR. HARDEN:** Well, it wasn't just that. You had the possibility of pregnant females. You had all kinds of things and people would lose their good deal kind of things potentially, you know, in the -- Most everyone tries to work themselves, you know, into a comfortable place on the porch. That's what this boils down to because people were very sensitive on goals. And you had like with production welders where

they were eyeball to eyeball with the -- you know, our product, you had to do a lot of folks. And they did finally rotate it to another building. And again I don't want to put names on tables because I don't have hard evidence, but the Fergus case I think is relatively solid or was during my last awareness. So it isn't like, you know, this is just fantasy. Keep in mind that I was a grunt, radiation grunt at Rocky Flats. I wasn't up in the -- you know, in the palace so I'm sure that the people in some of those departments have to know way more of these specifics than I do.

**MR. GRIFFON:** Okay. Well, thank you. That's what we -- when we say specifics we -- we don't necessarily mean names.

**MR. HARDEN:** Yeah, you do because it looks to me like we're chasing a lot of (unintelligible). I'm not just blowing smoke in any part of your anatomy. I'm -- I'm out here with the real deal. And my interest is of a concerned worker of 37 years duration at Rocky Flats and I've made a long list of people that never lived long enough to get their first pension check. So I am very emotional and very

aggressive about trying to get something done.

**MR. GRIFFON:** Well, we --

**MR. HARDEN:** Hopefully you share that. Maybe you don't and I guess we'll be at odds somewhere down the road.

**MR. GRIFFON:** No, we do share that. We appreciate your comments. All I was going to say is if you have more specifics it might be useful to give them to Tony and maybe not bring names up on the open line on the call but we -- we do want -- the more specific we can have the better we can track it back.

**MR. HARDEN:** And -- Now, who are you, sir? You know who I am.

**MR. GRIFFON:** My name is Mark Griffon and I'm -- I'm with the Advisory Board. I'm chairing this work group.

**MR. HARDEN:** I see.

**MR. GRIFFON:** And then there's a bunch of folks in Cincinnati from NIOSH and from SC&A and from ORAU, the contractors that are working on this project.

**MR. HARDEN:** Okay.

**MR. GRIFFON:** There's a whole lot of people on this phone call. The Advisory Board is

chairing this particular meeting.

**MR. HARDEN:** Well, all I can do is tell you to do more and do it quickly.

**MR. GRIFFON:** All right. Well, we appreciate that.

**MR. HARDEN:** All right.

**MR. GRIFFON:** We are trying.

**MR. HARDEN:** Do you want to talk to these people? Tony has no further comment for you today.

**MR. GRIFFON:** All right. All right, thank you.

**MR. HARDEN:** Yes.

**MR. GRIFFON:** Well, we'll get back to -- Brant, where were we? On 8?

**DR. ULSH:** I think we've gone through item 8, Mark.

**MR. GRIFFON:** Yeah.

**MS. MUNN:** (unintelligible)

**MR. GRIFFON:** I think one item there to follow up -- you had mentioned that -- follow up on -- on something about how you were going to go about (unintelligible)

**DR. NETON:** Well, we're going to value -- is that the one we were going to look at the tailing off of the cumulative dose?

**DR. ULSH:** No, that was (unintelligible)

**DR. NETON:** We're moving on to the -- the lead apron?

**MR. GRIFFON:** Yeah.

**DR. NETON:** Yeah, we need to take a look -- a closer look at that report that was done -- the evaluation that was done with lead apron usage and the reduction in dosimetry.

**MR. GRIFFON:** Okay. I think we're on 9.

**DR. ULSH:** Okay. Item 9 deals with an affidavit from the petition under the heading -- under the heading of missing dose record in areas of high exposure. One worker has provided an affidavit saying that a year's dose record is missing from a time that he worked in a high radiation area. He was a rad control technician and he gave the specific location, and he says that he was not rotated out of the area since he was a rad control tech. This goes back to an unmonitored radiation worker. If this occurred then we would use the techniques that I've mentioned earlier where we would interpolate from adjacent monitoring periods if the job was the same. Or alternatively we could conduct a co-worker dose

reconstruction.

**MR. GRIFFON:** This was actually -- this was being implemented (unintelligible) earlier.

**DR. ULSH:** Yeah, it sounded familiar, Mark, but I couldn’t pin it down so I knew it was in there somewhere.

**MR. GRIFFON:** It might be (unintelligible)

**DR. ULSH:** I think it --

**MR. GRIFFON:** If it was a claimant his files are available.

**DR. ULSH:** I think I checked on this and this guy’s not a claimant so I don't know that we would have access to his records but the response is that we do have methods to handle situations like this. I mean he would be an unmonitored worker essentially for this period and so I think we would apply co-worker models or use the nearby technique as laid out in the External Imp. Guide.

**MR. GRIFFON:** I wonder if -- if this person is in the (unintelligible) they may have access to their own personnel file.

**MR. LANGSTED**: It would have been requested.

**MR. GRIFFON**: (unintelligible)

**DR. ULSH**: Jim Langsted says that they probably

would if they requested it from DOE. Yeah, it might -- it might not be able to be done in a timely manner. I -- I --

**MR. GRIFFON**: And your -- your -- NIOSH's program doesn't (unintelligible) other individual records as part of the overall model?

**DR. ULSH**: We certainly have access to de-identified data but I don't know about chasing the individual data for other people that aren't claimants.

**DR. NETON**: I think we need to check into that because it's my opinion that we've got usage.

**MR. ELLIOTT:** (Unintelligible) takes us beyond the claimant's file, ask for data by co-worker data and build a data set.

**MR. GRIFFON**: I didn't hear that.

**DR. NETON**: That was Larry Elliott --

**MR. GRIFFON**: Oh.

**DR. NETON**: -- speaking but, you know, we have a MOU with DOE that I believe will allow us to go beyond just the broad data that we're requesting for the workers and that is to obtain additional data for example to develop co-worker models. So it's not clear to me that

we couldn't get this. I'm not saying we can but we'd have to check with our legal folks and others and make sure that it's -- it's appropriate but I think it's something that would be worth pursuing.

**MS. MUNN**: The question --

**MR. GRIFFON**: The only reason I'm raising it is because it's a very specific one and might be very useful.

**DR. NETON**: I agree with you, Mark. I think if we could -- if we could investigate this specific case -- again and make sure it's possible but if it were I think it would be worth looking at. I might say even if we can though, we might not be able to get these -- these records in a timely manner.

**MR. GRIFFON**: Right.

**DR. NETON**: It might take more than a week or two even -- even if we have the authority to request that.

**MR. GRIFFON**: Okay.

**MS. MUNN:** It's unclear to me, however, if this person is not a claimant how this affects the SEC.

**MR. GRIFFON:** Well, it's the -- it goes back to

the overall allegation, the no data available with regard to the database that did use the co-worker model.

**MS. MUNN:** So we're extrapolating the allegation to include more than this worker? Is that what I'm hearing?

**MR. GRIFFON:** My understanding that was a broader allegation as to the specific affidavit -- affidavit provided in -- as part of the petition. But the allegation was broader. They didn't just say one person said they had a record where there was no data available; they made a broader allegation. This was one affidavit that was very specific to that -- to that issue.

**MS. MUNN:** I guess I'd have to go back to the CD and look at the (unintelligible)

**MR. GRIFFON:** And that was my understanding. If the others -- if the others remember this differently I'm --

**DR. MAKHIJANI:** Yeah, Mark. This is Arjun. Ms. Munn, that is -- Mark is right. The petition is fairly complex but part A of the petition in certain portions raises many of these issues. And then I think these

affidavits in part B are kind of collectively individual examples demonstrating that the allegations are real although, you know, the specifics and generalities mixed in both parts.

**MS. MUNN:** Yeah, I'll go back and look at it. It just seems unusual to have a non-claimant -- I'll go back and look at it again.

**DR. ULSH:** Okay. Number 10. This comment deals with the bioassays were redone when they indicated high exposure. There are two examples that are cited. They claim that bioassays were redone for individuals and that they were recounted when the readings were high, and subsequent results were declared as having no exposure or false positives. This -- One of these examples is cited as important to the basis for the petition. So I'd like to walk through these examples. The first one is found in part A, page 47 of the petition. It gives several details. According to the petition the urine samples were positive for plutonium, were collected in July of 2003 and also later that year in September and December of 2003. And it states that there were also earlier positives in 2001 and '02. And it

states in here than an investigation was done by internal dosimetry including follow-up samples that were below the decision level and concluded that the 2001 and ’02 samples were false positives. In our response we have cited a -- the Rocky Flats procedures that govern investigation of positive bioassay results, and that procedure states that an intake is considered confirmed if one of the follow-up -- if one of the follow-up samples shows detectible levels of activity not associated with background or previous intake following a workplace indicator which exceeds the action levels. So that is pretty much exactly the situation that’s described in the example. However, I would point out that the example does not present any evidence that the conclusion that these were false positives was in error. The petition goes on to contend that the likely explanation is that it says, “it is probable that the detection of plutonium 239 and 240 at this time is the result of improved sensitivity in laboratory analysis and that there were small amounts of plutonium in the urine from old intakes that were only recently

detectible." I agree that's a plausible explanation and that actually supports NIOSH's dose reconstruction methods in that when a bioassay result comes back negative we apply missed dose so for those early time periods it could very well be the case that there was small amounts of plutonium present. It showed up as a below the limit of detection and we applied missed dose. And it's exactly for that reason that if you were to use more contemporary, more sensitive methods perhaps there would be a detectible level there. And that's exactly the justification for assigning internal missed dose. So I don't see that that presents a basis for concluding that we couldn't do accurate -- sufficiently accurate dose reconstructions. Now, the second example also gives a number of details here. That there was an incident which resulted in the contamination of a worker. The worker was apparently wearing a respirator at the time. The petition says that a lung count was taken and -- and was positive and a second lung count was taken and it was concluded that the first lung count was a false positive. And then the

worker states that eight years later he was given a dose for this incident and he states that he gave three fecal samples a number of years later, all of which gave positive results; and to his knowledge he had not been involved in other incidents. Again I would say that no evidence is provided that the conclusion that the first lung count was positive -- was a false positive, that that was in error. And I would say that this is exactly the justification for routine bioassay programs because workers may not be aware that they have had an intake unless -- at the time it occurs. And that's the reason that they do routine bioassay programs is to detect situations exactly like that. So I don't think -- in the absence of evidence that the conclusions of false positives were in error I don't see that these examples support the conclusion that we can't do sufficiently accurate dose reconstructions. That's the end. That's my response, Mark.

**MR. GRIFFON:** Yeah, I don't think your -- I mean I don't think (unintelligible) further action --

**DR. ULSH:** Okay.

**MR. GRIFFON:** On NIOSH's part. Now, it seems like the model -- the approaches that are being proposed would adequately address the situation but I mean I'm not going to (unintelligible) reading while you're talking.

**DR. ULSH:** Okay.

**MR. GRIFFON:** That's my general sense. I don't know if SC&A has any comments on that.

**DR. MAURO:** No.

**DR. ULSH:** I don't think so.

**MR. GRIFFON:** Well, we can leave it that the NIOSH action is completed at this point you know, no further action.

**DR. MAURO:** I'm sorry. This is John Mauro. You had mentioned that there was no evidence that the circumstance that was being alleged occurred. And namely that -- that the false positive was in fact not a false positive. How would you I guess -- I'm just trying to think of what would be in the record that would individual that -- is it the follow-up or is the follow-up -- let me see. Let me just think it through. So a person has a -- a chest count or a bioassay. Get a high result. Automa--

One of the things that's done as part of your procedure is to follow up, and when the follow-up is done you go -- you don't see it again. And -- And that is your evidence that in fact the original one was a false positive so that's where it ends.

**DR. ULSH:** You're essentially correct. It's actually stated in the opposite case, that the intake is confirmed if one of the follow-up samples shows up positive but you could -- you do have the right interpretation there I think. Okay. Then that takes us to comment --

**MR. GRIFFON:** I think the -- the most important part of that whole thing, you said it, Brant, to me, that you're -- when your zero or unless it's detectable (unintelligible) approach, right?

**DR. ULSH:** Right.

**MR. GRIFFON:** So we're going to be (unintelligible) anyway so I think that's an important part of the statement.

**DR. ULSH:** Unless there's further discussion on that we can go to comment number 11.

**MR. GRIFFON:** Okay.

**DR. ULSH:** Okay. And that's under the heading

of instances of no data available in situations of high exposure. We've talked about this somewhat already, this no data available issue.

**MR. GRIFFON:** Right.

**DR. ULSH:** The comment says that there is, for instance, an affidavit stating that no data available was entered into their record despite the fact that the film badge was blackened with exposure and the work was in a high exposure area, americium 241 processing. And by contrast the petitioner -- the affidavit in the petition contends that there were entries for positive dose when the worker was serving in the military in Korea which would certainly be troubling. I think we've talked about the no data available --

**MR. GRIFFON:** Is this another individual? I think he --

**DR. MAKHIJANI:** Mark, I think it's the same one.

**MR. GRIFFON:** Is it?

**DR. ULSH:** Well, let's take a look over on page 13. There's actually a copy of the affidavit that I redacted from the petition and if you look in the first paragraph of his affidavit he

says that when they did my dose reconstruction for the neutrons they included May 1963 to May 1965. I was on active duty in Korea and had handled no radioactive material while I was away from Rocky Flats. So and then the no data available issue is brought up a few paragraphs down. But I want to focus on the Korea situation here. If you look at the next page, page 14 in the handout, what you'll see here is the employee record card for this individual and if you look about halfway down in the third column, the column that's titled released, you'll see a date for 4/19/63, so April 19th, 1963. And the card does show that he quit with notice. He was entering the military service. So he worked for part of the year, the first part of the year in 1963 and then he entered the military. A couple lines down you'll see an entry under the hired column, 5/17/65 he was rehired. So this does agree with his affidavit that he worked a partial year in '63, was not there in '64 and worked a partial year in '65. Now, in his affidavit he also contended that he received neutron dose for this period. Page 15 of the handout is a copy of the NDRP data sheet

for this individual and what you'll see is that there is a dose in 1963 assigned. There is a dose in 1965; and there's no dose in 1964. This is entirely consistent with partial year employment in '63 and '65 and no employment in '64. So I would contend that this is not an SEC issue.

**MR. GRIFFON:** It also shows let me add an annual dose that you mentioned, not both -- not broken down further, right? But it does support -- It does support -- I mean that's certainly a possibility (unintelligible)

**DR. ULSH:** Okay. So unless there's further discussion on that one I'd move on to comment 12. Can we consider that one closed?

**MR. GRIFFON:** This person's obviously an individual that's a claimant, correct?

**DR. ULSH:** Pardon me?

**MR. GRIFFON:** This -- This is a claimant?

**DR. ULSH:** No, in fact this is not a claimant.

**MR. GRIFFON:** Then (unintelligible) the records.

**DR. ULSH:** I have the NDRP sheet. But I don't have any other --

**MR. GRIFFON:** You have his service records and

all that.

**DR. ULSH:** Yeah, that was included as part of -- was this from the NDRP, Roger?

**MR. FALK:** Yes.

**DR. ULSH:** Okay. This -- This was from the NDRP. But I don't have, you know, the typical records that we have for a claimant, you know, the extensive dosimetry records or anything like that.

**MR. GRIFFON:** I was just curious. You seemed to get the records. Okay. I would add the same action to this one. If possible can you track this person back and is their data available because I figure it is a different position. He doesn’t make a specific claim though but --

**DR. ULSH:** Okay. Yeah. We can put that -- let me see now. Working in the americium line. We can try it. We’ll -- We’ll take a look at it, Mark.

**MR. GRIFFON:** It’s not a specific (unintelligible). If it’s possible.

**DR. ULSH:** Okay. Comment number 12. Most exposed workers were not monitored for neutrons and the petition cites Roger Falk who is

sitting here at the table, saying that until July 1958 the most exposed workers were not monitored for neutrons, raising a question of how the neutron data and the NDRP study are to be used even if the re-reading of the badges is accepted as sound. In the -- In the response we're contending that the neutron doses can be reconstructed based on neutron dosimetry if it's available as adjusted by the NDRP. And that if it is unavailable we can use neutron to gamma ratios to calculate neutron doses. Regarding the last sentence, the last part of the comment, even if the re-reading of the badges is accepted as sound, NIOSH is not aware of any evidence that would call into question the soundness of the re-reads of the NDRP so I don't see this as an SEC issue. However, Arjun's reaching for the microphone.

**DR. MAKHIJANI:** Yeah. No, no. I -- There wasn't any implication that the reading wasn't sound. I just wanted to make sure that that wasn't an issue in this -- in this thing. That the only issue in this context was Roger Falk's statement that the most exposed people were not monitored. So that whatever the resolution of

all the NDRP issues, that should be set aside in -- in responding to this. That was the only implication that I had comment. But -- But the question is I don't know what the origin of that statement was and how -- how these -- how the neutron co-worker set is to be constructed.

**MR. FALK:** This -- This statement was taken from my presentation to the Rocky Flats DOE in 1994 of the results of the pilot study that we did to scope out the -- the nature of the neutron dosimetry problems in the ’50s and early ’60s. And then also to actually present what we needed to do about that. And that was the start of the neutron dose reconstruction project. And that I think has basically addressed all the issues that we found in the pilot study.

**DR. MAKHIJANI:** Including -- Including this one? Ron -- Maybe Ron knows the answer to this. I have not carefully gone over the NDRP. But including this problem that the workers that were monitored were not the most exposed ones?

**MR. FALK:** Yes, because we basically assigned what we called the no show dose to the people

who were not monitored based on the methods that are described in the protocol, especially the section -- especially -- especially section 11 of the protocol.

**MR. BUCHANAN:** This is Ron. Yes, this is exactly the question I have of my three questions that we were going to get to later; this is number one, was addressing the workers that were not monitored in the early ’50s which were asking folks to -- neutron radiation. And I realize, you know, one of the statements is that they monitored everybody (unintelligible) ten percent of the radiation techs got at that time. However, there was only 10 to 18 badges each during this seven-year period in the early ’50s and those (unintelligible) during the ’56/’57 time frame I believe, that area. And so my question is number one I guess (unintelligible) here in reconstructed dose for these radiation workers in the early ’50s you don’t have you’ve got co-worker information (unintelligible) badges (unintelligible) neutrons. How do we know that -- that they didn’t get over ten percent of the -- allowed limit because (unintelligible) the way I

understand it if you're going to reconstruct (unintelligible) for people that weren't badged, they would get ten percent of their (unintelligible) limits or (unintelligible) 600 a year -- 600 millirem per year. However, you might have radiation workers exposed to neutrons that weren't recognized at that time that weren't badged. We could have radiation workers that got, you know, more than ten percent. How -- How do these workers get identified and assigned a dose greater than this (unintelligible) values and (unintelligible)

**MR. FALK:** What we did is we went back to the rosters --

**MR. BUCHANAN:** Roger, could you get a mike? I can't hardly hear you.

**MR. FALK:** I thought I had a mike.

**UNIDENTIFIED:** Get real close.

**MR. FALK:** What we did is we were really concerned about the workers in building 71 which was chemical processing and also the plutonium metal working area in the '50s. And what we did is we got the building rosters. And also -- also during that time I think

essentially all of the workers were monitored at least for the gamma exposures. And so we did have the gamma data, the whole body penetrating gamma. So what we did is we applied a neutron to gamma ratio based on the chemical processor -- process operators in 1959 and we used that to -- to -- to then establish the no show dose for -- for the building 71 workers who were not monitored for the neutrons.

**MR. BUCHANAN:** And this dose could exceed the ten percent of the 600 millirem per year as described in the -- the external TBD section 6.9 seems to limit it to around 1.2 rem per year but on an individual case basis. It could be higher than that if they were -- were exposed to work which was perhaps (unintelligible); is that correct?

**MR. FALK:** When we did the NDRP project we did not pay any attention to the ten percent. We just -- We just multiplied the gamma dose which was required for them by the neutron to gamma ratio.

**MR. BUCHANAN:** Okay. I can’t -- when the dose reconstructor (unintelligible) person -- when

the dose reconstructor reconstructs (unintelligible) dose, if he could not come under the NDRP (unintelligible), what would be done about assigning missed dose.

**DR. ULSH:** This is Brant.

**MR. ROBINSON:** This is Al.

**DR. ULSH:** Okay. Good.

**MR. ROBINSON:** Based (unintelligible) the NDRP study and --

**DR. ULSH:** Al? Al?

**MR. ROBINSON:** -- the neutron dose refers -- its dosimeter report outside the study that we -- we would assume that he did not get any neutron dose. So that -- and we -- so we would apply that (unintelligible)

**DR. NETON:** Who was that?

**DR. ULSH:** That was Al Robinson. Al, you might be on a speakerphone. It's hard for us to make out your entire comment. Could you --

**MR. ROBINSON:** Is this better?

**DR. ULSH:** Marginally.

**MR. ROBINSON:** How about this?

**DR. ULSH:** That's better.

**MS. MUNN:** Yes.

**MR. ROBINSON** Is that better?

**DR. ULSH:** Yes.

**MR. ROBINSON:** Yeah, I've had a terrible time hearing, too, I've had the speaker up to my ear. Basically if -- if the worker was not included in the NDRP study and there's no other extraneous evidence, you know, that he would have had neutron dose then we would apply only penetrated photon dose with 600 millirem, if there was no other dose for that year. So we would rely to a large degree on the NDRP study to tell us that that person either had neutron dose on either side of -- of some gap that might be in there or -- or his work location/(unintelligible).

**DR. ULSH:** Ron, Ron.

**MR. BUCHANAN:** Yeah.

**DR. ULSH:** We can barely hear you again. Can you get closer?

**MR. BUCHANAN:** Okay. Can you hear me now?

**DR. ULSH:** Yup.

**MR. BUCHANAN:** Okay. The NDRP covers (inaudible)

**MS. MUNN:** You're fading in and out again.

**MR. BUCHANAN:** (inaudible) Okay. Can you hear me here?

**DR. ULSH**: Oh, yeah.

**DR. NETON**: Very loudly.

**MS. MUNN**: Very loudly, clearly.

**MR. BUCHANAN**: Okay. I understand that NDRP pre-read all the film badges, MDA film that was available that's re-readable whether they were plutonium workers or not. Now, I guess where I'm still unclear is they -- they didn't (unintelligible) in the early '50s. So if they re-read all of them at (unintelligible) acceptable as good, but what about the workers in the early '50s that did not have MDA plates (unintelligible) and they were exposed to more than the 600 millirem top? Are you going to use -- in the NDRP if you go back and reconstruct their -- their neutron dose -- excuse me -- photon ratio even if they weren't -- didn't have mda gamma plates to read?

**MR. FALK**: The answer is yes.

**MR. BUCHANAN**: The answer to that is yes?

**MR. FALK**: Yes, because we would then do the no-show dose multiplying their gamma dose by the neutron to gamma ratio for that building. Now -- Now, the people at Rocky Flats who were not monitored for -- for the neutrons were the

people in building 81 which was -- which was the enriched uranium and also building 44 which was the depleted uranium operations. But there is no real evidence that there was a significant neutron component to their external exposures.

**MR. BUCHANAN**: So they would not have a neutron dose assigned to them in those buildings?

**MR. FALK**: Yes, that is right.

**MR. BUCHANAN:** Okay. Okay. At this point I think that I understand how it was done. I would not want to completely sign off if this is not an issue, but I would need to -- to digest a little further. But I guess at the question -- at this time I don't have any further questions.

**DR. MAKHIJANI**: Could I ask, Roger -- Mark, sorry. Go ahead.

**MR. GRIFFON**: I was going to say I'm going to put that item number 12, Ron, add question number 1 into that and make it sort of one item on our list, and I'll -- I'll say there's no further response because SC&A is still reviewing.

**DR. MAKHIJANI:** Yeah. Well, Mark, I think I

need a little clarification because I'm looking at this Section 11 in the NDRP and I see where Roger says how they're going to fill these gaps in the dose, but I still don't understand what was the origin of the statement that the most exposed workers were not monitored and how filling these gaps actually addresses that question at all. If the most exposed workers were not monitored are we --

**MR. FALK:** They were not monitored for the neutrons. They were monitored --

**DR. MAKHIJANI:** For -- For the neutrons. That's what I'm saying.

**MR. FALK:** All right.

**DR. MAKHIJANI:** If the most exposed workers were not monitored for the neutrons, you got this lead apron problem where the workers were wearing the gamma badge under their lead apron, so you're shielding out the low energy gamma which is a dominant one from the plutonium.

**MR. FALK:** I'm not convinced we have evidence that they -- that they wore the lead aprons in the '50s however.

**DR. MAKHIJANI:** Well, yeah. I'm just trying to put whatever's on the table so that the issues

are at least clear as to the methodology. It didn't seem to me that that issue was brought up one way or another here, and if -- I'm just trying to understand. It was surprising to me to see that statement from you in the petition and I don't know what -- what was the sort of --

**MR. FALK**: The -- The --

**DR. MAKHIJANI:** -- empirical substance behind that statement for you to say that the most exposed workers were not monitored.

**MR. FALK:** The basis is that the people, the workers who were monitored with the glass plates were the building 91 workers, not the building 71 workers. And -- And basically retrospectively, the people -- the workers most likely to have been exposed to the neutrons were the chemical process operators, and they were in building 71 and that was the basis for my statement in 1994 when I was scoping out the issue.

**DR. MAKHIJANI**: Okay. So what do we do then about the building 71 workers who were the most exposed but for whom we don't have data?

**MR. FALK**: We have gamma data. We multiply

that by the neutron to gamma ratio and then you have a neutron dose which is -- which is our best estimate of their neutron exposure.

**DR. MAKHIJANI**: So then my point here would be that it would be crucial to clear up that they didn't have these aprons because your whole dose reconstruction method then depends on -- on that one fact because otherwise you -- you don't have -- you don't have -- The differential between gamma absorption in the apron and the neutron absorption in the apron is so big that -- that you don't have a method basically.

**MR. FALK**: Well, now, what we do know and the as-found condition when I came to Rocky Flats in 1966 was that the -- the -- was that the hands-on workers at the glovebox did not wear the lead aprons at that time, and it is a reasonable -- it is a reasonable extrapolation backwards that if they didn't wear it in the mid-'60s when they had really high -- when they had really high gamma exposures except -- and especially the soft gamma, that it would not be reasonable to actually expect them to have worn lead aprons back in the '50s.

**MR. LANGSTED**: And we validated that with an interview with Ed Putziere (unintelligible) who was the radiation protection manager in 771 building in those early years and no, lead aprons were not used essentially at all in -- in 71 in those early years.

**DR. MAKHIJANI**: Yeah. My -- My only -- I wasn't saying that they were or weren't used. I was just saying that that particular issue becomes crucial to your dose reconstruction method because it's the only thing that you've got for that building.

**MS. MUNN**: And it appears they've tied that down.

**DR. NETON**: Yes. Thank you.

**DR. ULSH:** Okay. We took a brief detour here to comment number 1 from the 24th of March set. I think we were on number 12.

**MR. GRIFFON:** Yeah. I think we're -- Well, if we're closed out on that I think we're on 13.

**DR. ULSH**: On 13. Okay. Let me see if I can get my head back on track here. Oh, yeah. This was another question. Roger, don't go far from the microphone -- about -- under the heading, Neutron Badge Reading Was Defective.

And the comment deals with a page from the petition that says -- that shows that zero entries and neutron dose readings dropped from 95.6 percent in 1961 to 56 percent in 1962 and the comment goes on to say that this raises the issue of quality of the badge readings in the earlier period. And this has been acknowledged by NIOSH and the NDRP study was put in place to address this issue. We agree that was the genesis. One of the reasons behind the NDRP issue and the NDRP did address those earlier reads, so I -- I think we're okay here and NIOSH or Arjun is nodding his head, so I think we're okay.

**DR. MAKHIJANI**: I got -- Ron -- Ron is the one that would know but I think -- I think that -- that seems --

**MR. GRIFFON**: Ron, did you have a comment on this?

**MR. BUCHANAN**: Well, I'd like to think that -- Well, I read the NDRP several times. We have not had formal review of that by SC&A. It's a pretty complex, lengthy document and I've looked over it but I have not made a -- a definite statement on, you know, had a review

of that. Now, some of the questions in number 2 and 3 of that list of questions, you know, relate to it. We have done a complete examination of NDRP by SC&A.

**DR. ULSH**: Okay.

**MR. GRIFFON**: I think that and the previous one are still open items, but there's no further action by NIOSH on the part of this (unintelligible)

**MR. BUCHANAN**: That's correct.

**DR. ULSH**: Okay. Comment number 14 is under the heading of Post-1991 worker monitoring was not according to criteria for security guards. And the situation described in the petition here is that during that time period, post-1991, the only workers who were badged were those who were thought to have the potential for a hundred millirem exposure per quarter or more, and the DNFSB found that security guards had potential for greater than that and they were unmonitored. If that situation were to occur, it -- I think NIOSH would approach it as unmonitored radiation workers and we would handle it using the co-worker model, do a co-worker dose reconstruction. So again I think

that we perhaps don't have an SEC issue here.

**MR. GRIFFON**: I -- I wasn't clear on your response. Are you saying that if that situation occurred, I mean this is specifically for security guards for this specific time period. Have you looked at the, you know, the report and is it -- are you in agreement with that report? And if it did occur, if you're in agreement with the report.

**DR. ULSH**: Yes. For such a situation, and it's described in the -- in the DNFSB report. The way that we would handle that would be to treat them as unmonitored radiation workers and do a co-worker data dose reconstruction. So Mark, would that fall into the category of our action has been completed?

**MR. GRIFFON**: I think so, and you -- we don't have a co-worker model to look at, do we?

**DR. ULSH**: No. Right. We talked about that earlier when we were on the matrix.

**MR. GRIFFON**: So in other words a co-worker approach would be used to be determined later, right?

**DR. ULSH**: Right.

**MR. PRESLEY**: (Unintelligible)

**MR. ROBINSON**: This is -- This is Al Robinson again. You know, one thing, you know, on the -- on the dose reconstruction to date -- now, we can apply the co-worker data --

**UNIDENTIFIED**: Could you turn that down just a little bit? We're having some complaints.

**MR. ROBINSON**: -- gamma exposure, but I would have applied 100 millirem per year as stated here to a security guard, you know, unless there was some evidence that gives any dosimeter -- dosimetry reports said, you know, he had a lot higher dose or had been involved in a -- in an incident or something. But if he was just a routine worker who was not monitored in that post-1991 period, then we would have felt that it fell under the admonitions there and given him 100 millirem.

**MS. MUNN**: I can't hear him.

**DR. NETON**: A little bit louder then.

**MR. GRIFFON**: That's interesting because that's exactly what I was thinking about, will the co-worker model necessarily end up assigning 100 millirem?

**DR. ULSH**: No.

**MR. GRIFFON**: Or greater. It wouldn't

necessarily.

**DR. ULSH**: The co-worker model would not rely on the 100 millirem criteria at all.

**MR. GRIFFON**: Right.

**MR. ROBINSON**: Right.

**MR. PRESLEY**: Question. If you did the co-worker model would you pick a co-worker model from the area where the guard claimed to have been and not another guard?

**DR. ULSH**: When we do co-worker dose reconstructions, we don't apply the co-worker information from a specific individual. Rather, we build our co-worker model on distributions of all the monitored workers. So we would select a claimant favorable percentile value for those years, and it would cover the entire population of monitored workers.

**DR. NETON**: I think this is --

**MR. GRIFFON**: We have to wait to see the co-worker models.

**DR. NETON**: Yeah. I think we need to develop the co-worker model. The security guards to me seem to be an issue -- a situation where we might need to take a little special precautions. It occurs to me that, you know,

if we applied the 95th percentile of distribution, we may overestimate these workers and in fact --

**MS. MUNN**: Significantly.

**DR. NETON**: -- maybe that even the 50th percentile.

**MS. MUNN**: Significantly.

**DR. NETON**: So it appears that the true exposure may be somewhere between this --

**MR. GRIFFON**: Right.

**DR. NETON**: -- 100 millirem and the 50th percentile. We -- We would need to take a slightly closer look at that to figure out where it would --

**MR. GRIFFON:** That's why I was -- I was asking first if you're in agreement with the DNFSB report (inaudible)

**DR. ULSH:** I don't -- I don't have any reason to fault or to doubt the DNFSB report at this time.

**MR. ROBINSON:** Because the other, you know, the other issue is like any other -- like any other dose reconstruction. You know, if there was a year or a couple of years, then we would look at the dose on either side, so often you could

tell whether or not there was (unintelligible) gotten a higher dose.

**DR. NETON:** One thing I'm not clear on is this -- this comment says that 100 millirem exposure per quarter. My recollection of (unintelligible) 4835 is that it was 100 millirem per year. I'm not sure why Rocky Flats would adopt something that would be inconsistent with the regulations. We need to take a look at that as well.

**MR. GRIFFON:** Could it have been --

**DR. NETON:** It could just be a typo.

**MR. GRIFFON:** -- probably.

**MR. LANGSTED:** You're correct, Jim. The criterion would be 100 millirem per year --

**UNIDENTIFIED:** A year.

**MR. LANGSTED:** -- for badging.

**MR. GRIFFON:** For (unintelligible)

**DR. NETON:** Actually, the -- I think the 835 interpretation is the internal/external exposure were independent source terms. At least that's the way most sites interpreted it.

**MR. GRIFFON:** Oh, yeah. We've been around -- I've been around the block now. Yeah, I think you're right though. Yeah.

**DR. NETON:** In fact -- Well, yeah.

**MR. GRIFFON:** But anyway, that -- Yeah, so I think your -- we ought to respond at this point, I think.

**DR. NETON:** I think we do, too.

**MR. GRIFFON:** How it's going to be handled in terms of co-worker model.

**DR. NETON:** Well, I think Brad is actually right that this is really an interpretation issue and not a -- a bounding dose calculation issue for SEC implications. This is -- This is rather where one fixes the set point for reconstructing what -- what would be unmonitored dose in this case.

**MR. GRIFFON**: I would agree.

**DR. ULSH**: Okay. The next comment is comment number 15, and this is -- this is an involved comment. It's going to take a little time. I don't know where we stand in terms of breaks, but we're going to be here for a while if we bump into 15.

**MR. GRIFFON**: Well, I'm certain we could get through, but maybe we should take a break at this point.

**DR. WADE**: Okay. If we got some heavy --

Let's take a very quick five minute stretch break and --

**MR. GRIFFON**: Take five.

(Whereupon, a recess was taken from 3:40 p.m. to 3:50 p.m.)

**DR. WADE**: Okay. We're back in session.

**DR. ULSH**: Okay. I think we left off with comment number 15, and this comment is under the heading of many incidents were not reported or recorded. And this comment cites some pages in the petition that actually constitute a consent order between the Department of Energy and Kaiser Hill. I've scanned and put this into this handout. It starts on page 19 and I'd like to walk you through this consent order. If you look at near the bottom of page 19, you'll see a paragraph that begins internal intakes of radioactive material occurred with two workers who were doing some underground tank remediation activities. This is the first example that's dealt with in the -- in the consent order, and this occurred in 1996. What happened here was that due to a number of issues dealing with regulatory compliance primarily, the consent order describes some

failings on Kaiser Hill's part to maintain ALARA. And what happened was that these workers got some intakes; however, this was not discovered at the time of the incident. Rather, it was discovered through routine bioassay for one worker and by a special request bioassay for the second worker. That's described on Page 20. Again, I don't -- I don't think that this actually demonstrates issues that were unreported. In fact, this is exactly the opposite. This issue was discovered and -- and investigated and included in a consent order. Rather, it shows that intakes are not always recognized at the time that they occur and that's why you have a routine bioassay program. So I think that that's really all I want to say about that particular example. The next incident --

**MR. GRIFFON**: Again, were -- were all workers under the routine bioassay program?

**DR. ULSH**: Were all workers under the routine bioassay program in 1996?

**MR. GRIFFON**: (unintelligible)

**DR. ULSH**: I'm looking at my -- at my subject matter experts for the answer to that question.

**MS. MUNN**: Bioassay programs?

**DR. NETON**: This is Jim Neton. I think that in -- by 1996 the requirement was to have all workers with the potential to receive 100 millirem --

**MR. GRIFFON**: Right.

**DR. NETON**: -- on some type of bioassay program. So it probably wasn't all workers, but --

**DR. ULSH**: But these workers were.

**MS. MUNN**: Yeah.

**DR. NETON**: Right.

**MS. MUNN:** (unintelligible) pretty serious.

**MR. GRIFFON:** You've been answering several of these questions with the fact that well, that's why you have bioassay programs but you get -- The question is really more complicated if the individuals involved in the incident were not on the bioassay program or never were on the bioassay program.

**DR. ULSH**: But there's no evidence of that presented here, Mark. This -- This consent order deals with an incident where workers who were on routine bioassay programs had an intake. So I don't think that this consent

order can be used as evidence that the opposite --

**MR. GRIFFON**: Well, there was one person at least that indicated -- I haven't read it yet, but the one person indicated he had requested a bioassay but he was not on a routine program.

**MS. MUNN**: Well, the consent order says uptakes were discovered through routine bioassay.

**DR. ULSH**: For one worker.

**MS. MUNN:** For one.

**DR. ULSH:** And then by special request for bioassay --

**MS. MUNN**: Requested by the other.

**DR. ULSH**: -- by the second worker.

**MS. MUNN**: Uh-huh.

**MR. GRIFFON**: Right. So you self-identified, and if that's fine for this situation. I guess that's just what I'm asking, both what the percentages were for -- because I think you have people -- I think it's just a question of how do you handle the unmonitored and what fraction of people fall into that category, I guess is what I'm getting at.

**MS. MUNN**: Does --

**MR. GRIFFON**: Now, I understand the unmonitored

people --

**DR. NETON**: Yeah. I mean we took --

**MS. MUNN**: (unintelligible) requested (unintelligible)

**MR. GRIFFON**: -- were either involved or not involved in it.

**DR. NETON**: Typically, Mark, as you might remember, the way we handle co-worker data for internal exposures are that workers who were judged by NIOSH to have -- were not monitored and should have been monitored --

**MR. GRIFFON**: Right.

**DR. NETON**: -- because they had high potential, would receive the 95th percentile --

**MR. GRIFFON**: Right, because --

**DR. NETON**: -- the co-worker model.

**MR. GRIFFON**: -- it might -- maybe (unintelligible) the model (unintelligible)

**DR. NETON**: Right. And then if in this case, you know, it depends on how this worker, what his job function was. But if it was judged that he probably didn’t need to be monitored on the program, he would have received the 50th percentile. Then there’s a further cut point for someone who really had almost no potential,

which would be the secretarial/administrative types.

**MR. GRIFFON**: Right.

**DR. NETON**: So that's -- that's how it would be handled.

**DR. ULSH**: And I -- Mark, I -- I -- The consent order --

**MR. GRIFFON**: That's what I assume you said, the co-worker was monitored.

**DR. NETON**: Yeah.

**DR. ULSH**: Well, the consent order does say that for the second worker it was a special request for bioassay; however, it doesn't say that he wasn't on routine bioassay in addition. It's just that it was discovered by the special request.

**MR. GRIFFON**: Okay.

**DR. ULSH**: Okay. The next example begins at the bottom of page 20 of the handout, and this -- this details a number of individuals in '96 and '97 who were not monitored and later it was discovered that they actually did receive a dose while they were not monitored. And keep in mind, though, that this comment is under the heading of incidents that were not reported or

-- I want to get the right word -- not reported or recorded. Okay. So this incident we've got unmonitored individuals receiving dose, however, I would direct you to the middle of the -- the bottom paragraph on page 20 where it talks about SSOC, Safe Sites of Colorado. They initiated an investigation and dose reconstructions began for these individuals in mid-September of 1997. So these -- these incidents are not examples of -- of instances that were not reported. On the contrary, they were investigated. The next example is not terribly informative. I don't think it's being advanced in relation to the SEC petition. That's at the top of page 21. Deals with a sealed source custodian conducting an inventory and he didn't receive the training that he should have received. I don't think that that's really an issue that we need to go into, although I will if anyone wants to. Okay. Finally, we get to the conclusions, section 3. It's labeled section 3 on page 21 and I'd like to just read that to you. It says that DOE has evaluated the results of the investigations conducted by Kaiser Hill and has concluded that

the findings and conclusions with respect to these incidents are comprehensive. DOE has concluded that these investigations fully and accurately disclose all relevant facts including the identification of potential violations of nuclear safety requirements. It goes on and talks about in the areas of radiation protection and quality assurance and objectively assesses the actual potential or programmatic safety significance of these potential violations. This consent order does not show events that were unrecorded and uninvestigated. It shows exactly the opposite, and the conclusions stated here, I -- I think put their interpretation on there. Comment -- section 4 says that DOE acknowledges Kaiser Hill's -- Kaiser Hill's aggressive and comprehensive investigation to determine the causes of these incidents and open an objective assessment of the operational shortcomings involved. DOE has also evaluated and agrees with the adequacy of the corrective actions. I don't see this as evidence for many incidents going unreported and uninvestigated.

**MR. GRIFFON:** Okay. I mean that was a thorough

analysis of -- of -- I'm not sure where the -- that list is from. Is that table E-5 or --

**DR. ULSH**: This --

**MR. GRIFFON**: -- I have all the references of all the --

**DR. ULSH**: Let me go back to the comment.

**MR. GRIFFON**: -- but they were all in the '90s, right, meaning --

**DR. ULSH**: Well, yeah. I was addressing --

**MR. GRIFFON**: -- I'm going -- I'm going to the first section of the comments, number 15 says the petition claims (reading) "throughout the history of the site it was common practice for incidents in the workplace be handled at the floor or building level and not reported." I don't know if you have a response to that part of it.

**DR. ULSH**: I think that that is true, Mark, that there were incidents that were at the discretion of the floor super-- of the -- of the management that were to be decided what was a sufficient magnitude incident to report. I think that that's probably true.

**MR. GRIFFON**: The real response there is that we'll still capture the dose on the routine or

co-worker model, right?

**DR. ULSH**: Exactly.

**MR. GRIFFON**: Routine bioassay or co-worker model.

**DR. ULSH**: Exactly.

**MR. GRIFFON:** And Jim's explanation -- I mean we haven't seen a co-worker file yet but if it holds true that we -- if they were supposed to be -- should have been monitored or -- so we have a 95th percentile approach.

**DR. ULSH:** Right.

**MR. GRIFFON:** Okay.

**DR. ULSH:** Okay. Unless anyone has any questions or wants some follow-up, we're up to almost the end here. All right. Comment number 16 on this data set, and that's on page 24. I had a little trouble following this comment and -- and I might have misinterpreted it. It appears to be concerned with the estimation of doses from material that was inhaled and then cleared out of the lungs and swallowed, ingested. That's the way I interpreted the comment, and I -- and it asks how we would handle this issue. And my response is the ICRP models take this

phenomenon into -- explicitly into account. They do -- ICRP 66 does consider material that's cleared from the lungs into the GI tract and so the models that we use handle the situation. Maybe I misinterpreted the comment; I don't know.

**MR. GRIFFON:** You know, it seems to be asking about both. Can someone read the comment? I don't have the full comment or the full --

**DR. ULSH:** Yeah, because it -- Well, it says that workers ate in workplaces and that's --

**MR. GRIFFON:** I think it boils down to Arjun's review, right?

**DR. ULSH:** Pardon?

**MR. GRIFFON:** Arjun, can you speak to that comment?

**DR. MAKHIJANI:** I was looking at a previous one still. Sorry. I missed it.

**DR. ULSH:** Comment number 16, Arjun.

**DR. NETON:** The one about ingestion, 16.

**DR. ULSH:** We were -- We -- It seems to be that this comment's concerned with how you deal with material that was inhaled and then cleared out of the lungs and swallowed, ingested. Is that -- Is that correct?

**DR. MAKHIJANI**: Yeah, I -- I think --

**MR. GRIFFON**: Eating in the workplace (unintelligible)

**DR. MAKHIJANI**: Yeah, the -- the -- the problem would be, you know, if there are ingestion doses that are significant and -- and in light of the low systemic doses from the inhaled component, could it be that it might be higher doses or if -- if bioassay data were reinterpreted as ingestion doses, whether they might give you a different result or -- or how you calculate that component.

**DR. NETON:** Yeah. It -- It appears to me looking at the paraphrase of the issue raised, that there are two questions here. One is --

**DR. MAKHIJANI:** Right.

**DR. NETON:** I agree with Mark on that. One is that there was ingestion via inhalation and Brant's answer is right on target here in relation to that, that any ingestion as a result of an inhalation dose is explicitly dealt with in the ICRP models. I think we all agree with that. Now when they -- when they assert here that workers ate in the workplaces and how the bioassay data would be interpreted.

In light of this problem an ingestion may have occurred via re-suspension, that -- that -- well, re-suspension would be --

**MR. GRIFFON:** All it did was provide that re-suspension would be still be inhalation.

**DR. NETON**: Yeah, re-suspension would be re-inhalation so --

**MR. GRIFFON**: Yeah.

**DR. NETON**: -- really then we're back to workers ate in the workplaces and potential ingestion pathway, and I don't recall what -- how in -- how specifically the ingestion pathway was dealt with in the Rocky Flats site profile. And my recollection is that there were some comments by SC&A on that issue.

**UNIDENTIFIED**: Something I recall.

**DR. NETON:** And -- And I'm at a loss as to how to -- how to -- how to bracket that. I think -- I think the -- you know, plutonium itself has a very low gastrointestinal absorption factor. I think that's well-recognized. But we need to -- I think we need to reevaluate this comment in light of the fact that, you know, they are -- I think they are sort of asking about how we're dealing with

ingestion doses and from eating in the workplace and we -- we need to -- we need to re-look at that I think, and -- and address it.

**DR. MAKHIJANI:** Yeah. Just for clarification, Jim, I did not go back to our -- to the site profile or the site profile review. As you can see, sometimes these were quick paraphrases and --

**DR. NETON:** I understand.

**DR. MAKHIJANI**: -- thank you for making -- making them more accurate as you went.

**DR. ULSH**: Well, I completely understand, Arjun. Some of my responses were pretty quick, too, so -- in fact, all of them were. Okay. Number 17. This is length of the work week. Worker alleges that the work week was logged as 40 hours when it was 45 hours. This might fall into the category of an issue that may not have SEC implications, especially at Rocky Flats because this -- this consideration --

**MR. GRIFFON**: (unintelligible)

**DR. ULSH**: Right, exactly. This would be important if we were doing a source term calculation perhaps. We don’t propose to do that at Rocky Flats. We were going to rely on

individual dosimetry results, so I don't -- Okay. That's okay, Arjun?

**DR. MAKHIJANI**: Yeah.

**MR. FITZGERALD**: Just a -- That's closed. I want to go back to 15, and we did have a issue. Item 15 on the original matrix.

**DR. ULSH**: Oh.

**MR. FITZGERALD**: And I'll just read the NIOSH response, which I think is where that was left in terms of ingestion. Discussion of the ingestion pathway will be -- will be added to the TBD. So I guess that infers that it wasn't there.

**DR. ULSH**: Right.

**MR. FITZGERALD**: And the ingestion pathway, except as a clearance process for inhalation intakes is not significant for workers in plutonium-enriched uranium process areas because eating and drinking in the process areas were strictly forbidden. It is not clear how strictly the rules were enforced for depleted uranium areas. This issue will be reviewed. That's what we had --

**DR. ULSH**: Okay.

**MR. FITZGERALD**: When we left it in the site

profile.

**DR. NETON**: I thought that was my recollection.

**DR. ULSH**: Okay. That was the big data, the big comment set.

**MR. GRIFFON**: Now we go on to March 24th, is that --

**DR. ULSH**: Yes.

**UNIDENTIFIED**: Yeah.

**MARCH 24TH COMMENTS**

**DR. ULSH**: Now we're on to March 24th. I think we've talked about comment number 1.

**MR. GRIFFON**: Right, under previous discussion.

**DR. ULSH**: Right. So now we get into comment number 2. This, Mark, to track this back, I think it's -- the first incarnation was we were going to provide plutonium tetrafluoride calibration data, and we referred SC&A to Mann and Boss. They have reviewed Mann and Boss and then these questions result from that review.

**MR. GRIFFON**: Does it go back to number 6?

**DR. ULSH**:: Oh --

**MR. GRIFFON**: Or should number 6 be original (unintelligible) --number 6 -- because I have to put this together later.

**DR. ULSH**: Yeah, let me look, Mark.

**MR. GRIFFON**: I think it's 7. Maybe it's 7.

**DR. ULSH**: It's matrix issue number 7, action item number 1 from the February 27th matrix.

**MR. GRIFFON**: Right.

**DR. ULSH**: So that's kind of the pedigree of this issue. Okay. When we referred SC&A to the Mann and Boss article, we were doing that to provide details of the calibration sources that we used in the NDRP. It's -- What we've concluded based on the time estimates that were given in Mann and Boss for reviewing these -- the NTA films is that they focused on the large obvious tracts. In contrast, the NDRP focused not only on the large obvious tracts, but tracts as small as three to five grains. And so they were much more sensitive -- the NDRP results were much more sensitive to the low energy neutrons, and what the NDRP did to deal with this calibration issue was they exposed four films -- and Roger has corrected me in my response on page 3. I said they were four replicate films. In fact they were not replicate films. They were four films over a range of doses. They were exposed to the bare source, which is shown in Mann and Boss. They

were also exposed to the most moderated neutron source, and they were read blindly. And what they found was that there was an insignificant difference between the two. The moderation didn't affect the sensitivity of the films. The difference was only about two percent, therefore, they concluded that there was no significant difference and they used the overall calibration factor. Now, Roger, correct me if I said anything wrong there.

**MR. FALK**: That is -- That is correct.

**DR. ULSH**: That's -- Okay. And that's described in section 8 of the NDRP, page 15.

**MR. BUCHANAN**: No, this is wrong. Okay. I have a question on that. Now, I understood the last time we talked, Roger said they did not re-expose any -- any film there in the NDRP process. Is that correct or incorrect?

**MR. FALK**: I did not expose any films for the NDRP project. These were the calibration films that I had exposed in 1967 and '68 during the -- during the lifetime when I was basically overseeing the neutron film reading at that point. So these are basically archived films that I had essentially archived from those

early times, and then I constructed the -- the calibration sets for the film readers for the NDRP projects from those old calibration films. And I -- And then I put in each set, four films of the bare moderation and four films of what we called the demoderation, which was that -- was that -- the -- the -- which was the thickest moderation of the -- of the Mann and Boss set. So we had the unmoderated and then we had the heavily moderated, and what we did is that is that all of the film readers for the neutron dose reconstruction project blindly read those films to establish what the millirem per track would be for their readings. And then at the end of the project, I basically took all their data and then did a comparison of their calibration factors for the -- for the unmoderated plutonium fluoride source and I compared that to their own calibration factors for the moderated source and did an overall composite and found only a -- found only a two percent difference. Therefore, I said there was no significant difference. We can use the calibration set based on the composite for the final analysis of the neutron doses for the

NDRP project.

**MR. BUCHANAN**: So you're saying that when you reread the older calibration film, that you found out that the millirem per tract or per square millimeter was the same in heavily moderated as it was with the bare neutron source. Is that what you're saying?

**MR. FALK**: Yes.

**MR. BUCHANAN**: And you're saying that Mann and Boss in the past had not read the shorter tracks and so they'd seen the difference and that explains why they'd seen the difference and you didn't?

**MR. FALK**: I am basically speculating that to be the case and I'm not even sure that Mann and Boss actually read those. I am thinking it's more likely that the film readers -- that the film readers of that era read the films and they would more -- most likely read -- most likely read only the obvious tracks and not the -- and not the shorter less obvious tracks. That -- That is my working hypothesis as to why there is that difference.

**MR. BUCHANAN**: This one is very different in the length of the track from the moderated to

the unmoderated. Maybe you counted the same number of tracks per -- per millirem. Were there difference in the length like for say, the unmoderated, were the lengths of the tracks longer generally on an average then say the moderated source?

**MR. FALK**: I am visualizing that, and also I had pondered that. But I would say that -- that a film reader would not be able to tell just by looking at the films which one was moderated and which one was not. It is not obvious to me.

**MR. BUCHANAN**: Okay. Yeah, I see what you're saying. It kind of goes against the grain of -- of most neutron dosimetry and so that has to consider whether, you know, what would be -- be scientifically tolerant as compared to other information that's out there. I think I follow what you're saying you did now. I wasn't sure from the NDRP. Like I say, I haven't scrutinized it page for page, but I understand what you're saying at this point. The second question then, in -- in evaluating the neutron fields at Rocky Flats, so at this point say we accept the fact that the neutron reader, the

film readers read the tracts equally well from -- the calibration factor is the same whether you use the moderated or the unmoderated source, which I think it was stated as 1.4 MeV for the unmoderated and .15 MeV average apparent energy for the moderated. Those did cover all the reasonable neutron spectrums at Rocky Flats through the years, so it's going to be applying it to all situations through all times at Rocky Flats and so apparently you feel that this covers all the situations that would reasonably exist.

**MR. FALK**: It covers all the film situations in the '50s and '60s. I have not -- I have not -- I have not extrapolated that into the later years because we're using the -- we're using a different system. We're using the -- the -- the TLD system after that.

**MR. BUCHANAN**: Yes, okay. Right. I should be -- I should have stated up through the MDA.

**MR. FALK**: Yes.

**MR. BUCHANAN**: Does anybody else have any comments on that question?

**DR. MAKHIJANI**: Yeah, this Arjun. If I -- If I recall, the average moderated energy is .15

MeV. Is that right, Roger?

**MR. FALK**: That is the measurement that Mann and Boss --

**MR. BUCHANAN**: Yeah, right.

**MR. FALK**: -- had reported.

**DR. MAKHIJANI**: So I'm -- I'm just wondering. I know you feel the uncertainties are low, but what we've got is really a measurement that's heavily weighted in the high energy spectrum, or extrapolating because we know the spectrum of the moderated neutrons; is -- is that right?

**MR. FALK**: We don't know the spectrum of the moderated neutrons. We know the spectrum of the unmoderated -- we know the spectrum of the unmoderated neutrons for -- for a plutonium fluoride source based on spectrum in the published literature that I don't know the reference to at this point.

**DR. MAKHIJANI**: Yeah. And -- And how -- how are we then calculating the spectrum of the unmoderated neutron --

**MR. FALK**: We aren't calculating --

**DR. MAKHIJANI**: -- of the moderated neutrons?

**MR. FALK**: We aren't calculating the spectrum. The way that I described it in the Boston

meeting is what we did, or -- or what I did is we had the source term for the plutonium fluoride source as given to us by calibration at -- at the Los Alamos graphite pile. We can then calculate the -- the -- the neutron dose rate at a certain distance based on the spectrum and based on the -- and based on the source term which was called -- which was called the Q value for the unmoderated. Then we took the Henkins ten-inch sphere neutron dose rate meter and calibrated that to the unmoderated source. Then we put the moderator around the source and measured the dose rate from that moderated source, so -- so the -- and so the Henkins ten-inch sphere became a secondary transfer standard and that's how we determined the -- the dose rate at that same distance for the moderated source.

**DR. MAKHIJANI**: So in effect you have -- you have a spectrum for the moderated source?

**MR. FALK**: We have a spectrum, but we do not have it quantified.

**MR. BUCHANAN**: You have an effective average energy, not a detailed spectrum; is that what you're saying?

**MR. FALK**: We don't go through that step. We go straight from the dose rate measured by the ten-inch sphere meter calibrated to the dose rate calculated for the bare source at the same distance. So we have a transfer standard in that -- in that instrument.

**DR. MAKHIJANI**: Okay. I'll -- I'll have to absorb this like sort of a dose almost.

**MR. FALK**: Right.

**DR. MAKHIJANI**: But what -- what's the uncertainty between, you know, that's created by -- by doing it this way rather than knowing the spectrum of the moderated neutrons? I mean that's I guess what I'm getting at.

**MR. FALK**: It is hard to know that spectrum. The basic technique at that time was a multi-sphere type of a system which was still very -- which was still very primitive just to -- just to go through that secondary step, and why do that when you can go straight to a dose rate measured by the instrument which is -- which is touted as a rem meter and was a standard for all field surveys at that time.

**MS. MUNN**: (unintelligible)

**DR. ULSH**: Is -- Is there anything else on

comment number 2?

**MR. BUCHANAN**: No, and the -- we already discussed the -- the NTA calibration -- site calibration earlier so we don't have to address that last sentence then.

**DR. ULSH**: Okay. Folks, we've almost made it. We're on the last comment, comment number 3.

**MS. MUNN**: (unintelligible)

**DR. ULSH**: That's 19 -- The comment concerns 1970 neutron data, and that was a strange year, 1970 was. What you have to consider is that there are essentially three time periods when we consider neutron doses at Rocky Flats. The earliest is 1952 through 1969, which was covered by the NDRP. Now, the NDRP did actually look at a few field films that were available in 1970. I'm going to rely on Roger to fill in the holes in my -- my account here. As I understand it there were films, a limited number of films in 1970 and those were for the workers that were most exposed. Is that correct, Roger? The chem ops in '71 (unintelligible)

**MR. FALK**: All of the workers in the primaries were monitored with the films. Most of those

were not archived to be available to be read by the NDRP project. Only the -- only the films essentially for the process operators and a couple other higher exposed groups were available to be read by the NDRP project.

**DR. ULSH**: Okay. So that's the first time period. The middle time period spans 1970 to 1976 and during that time period, neutron and gamma doses were combined into one value which was named penetrating dose. And then you have the third time period, and that's from 1977 forward, and we have calculated a neutron to gamma ratio from that time period. And what we did was we extrapolated backwards. We extrapolated that neutron to gamma ratio calculated from 1977 forward. We've applied that to the 1970 to '76 time period, and the reason that we did that was because both of those time periods from '70 to '76 and '77 on were in the TLD era, whereas before, in the period that the NDRP covered, we were in the NTA film era. So we thought that it would be more appropriate to use a neutron to gamma ratio calculated with TLD's for that middle time period. Now, what I want to emphasize is

that during that time period when we had the -- only the penetrating dose, essentially we can -- one approach that we have used in the past is that we've double-dipped. We've applied -- Since we can't say how much was neutron, how much was gamma, we apply it to both. And that is, we contend, claimant-favorable. Alternatively, we could apply it all to neutrons or all to photons, whichever is claimant-favorable. And Al Robinson, are you still online?

**MR. ROBINSON**: Yes. Yes, I am.

**DR. ULSH**: Okay. So you jump in and correct me when I'm going astray here, but that's how we handled the 1970 time period. We applied to neutron to gamma ratio calculated in the later time period, so Arjun or Ron, does that answer your questions on that?

**MR. BUCHANAN**: Well, the question I have is that in 1970 -- and I understand that that's what you was planning on doing; however, if that -- in the NDRP in section 11.5 says that the gamma dose could not be consistently or accurately discerned from the data on the gamma TLD worksheet. And so my concern was how did

we apply it to a gamma ratio if we don't know the gamma dose in all cases.

**MR. FALK**: The answer is that -- that the NDRP project did not attempt to -- to actually assign a notional dose for the workers in the year 1970, not because of the gamma issue but because we couldn't identify the gaps because we could not -- we could establish from the worksheets available a -- we could not establish a coherent timeline for those workers to know when there were gaps and when -- and when there were not gaps. Actually, the issue is somewhat moot because I don't think there were likely many gaps because -- because workers were actually monitored for the neutrons in that time period. Then -- Then -- Then, also the issue with the gamma doses from the TLD's is the fact that the doses were not calculated by the technicians on the worksheets. Rather, they were calculated by the mainframe based on the crystal readings. And therefore, we -- therefore, we didn't have the information on -- on the worksheets that would allow us to essentially reconstruct what the IBM mainframe would have called their gamma

dose just from the crystal readings. And since we couldn't establish the coherent timeline for them, it was a moot issue anyway because we didn't bother trying to go through that effort to then recalculate the gamma doses if we weren't going to be able to do the notional dose anyway. So basically the scope of the NDRP project did not extend into 1970 except for the films we had available to be reread.

**MR. BUCHANAN**: Okay. So it seems you're saying that the gamma dose is available on the mainframe and so that's not what it's referring to there in 11.5, that the workers' records have the gamma dose reported; is that correct for 1970?

**MR. FALK**: Yes, that is correct.

**MR. BUCHANAN**: Okay. So that -- that clarifies a lot of issues. Okay. And -- And then the other last issue was in the -- in the OTIB 50 it states that -- it talks about NDRP neutron dose for 1970, and I -- if I understand you right, you're saying that there are -- you did a few re-reads on the MDA's for the '70s so there's some data there, but it's not as complete as the other years; is that correct?

**MR. FALK**: Yes.

**MR. BUCHANAN**: Okay. Well, that clarifies a lot of issues on question number 3.

**DR. MAKHIJANI**: When did they start wearing the lead aprons?

**MR. FALK**: I do not know.

**DR. MAKHIJANI**: So this -- Again, whenever you've got neutron to photon ratios I guess you -- you're going to have this question.

**MR. FALK**: Yeah.

**DR. MAKHIJANI**: Presumably.

**MS. MUNN**: But it wasn't the '50s and '60s --

**DR. MAKHIJANI**: Yeah. Well --

**MS. MUNN**: -- it was the --

**DR. MAKHIJANI**: Right.

**MR. FALK**: It was transferred to the body counter also in 1970. It wasn't a very well-behaved year.

**MR. GRIFFON**: Hey, Ron, did the question we just discussed, the two questions, do they fully address any issues that are -- I just got the report from Joe that he forwarded me, and your report on the OTIB 50. Are there other issues in there that were not in this question?

**MR. FITZGERALD**: Ron, just to clarify, you earlier indicated that these three were the ones that perhaps touched on some SEC significant concerns. I don't -- I think there's other perhaps questions, but they're probably just more site profile related.

**MR. BUCHANAN**: Yes, that's correct. These -- These three were -- were boiled down to be the possible SEC which I needed to address, you know; of course we did make a statement on that. But yeah, I think the rest of these (unintelligible) in OTIB for site profile that were TIB's. I didn't have a lot of question on that. It was so directly linked to NDRP. But I had to ask each questions on NDRP to fully evaluate OTIB. So no, I don't think that they're SEC.

**MR. GRIFFON**: Is there anything else on -- on comment 3 or are we closing in on the end here?

**MR. BUCHANAN**: I think that the -- that's it for right now.

**MR. GRIFFON**: Do you want to go through the other 20 comments?

**DR. WADE**: Sadly, we're close to the end. We were having such fun.

**MS. MUNN**: Sadly indeed.

**MR. GRIFFON:** We're at the end of our packing list here.

**MR. FITZGERALD:** You haven't hung up, Mark.

**MR. GRIFFON:** I don't think we have any sample DR's at this point for Rocky or anything like that.

**DR. ULSH:** No. No, not yet.

**MS. MUNN:** We're nearing the end of our energy level as well, Mark.

**MR. GRIFFON:** Right, right. It's not only the microphones fading now, it's the people.

**MS. MUNN:** True, true.

**MR. GRIFFON:** So I think it's time to adjourn unless there's any other issues here.

**DR. WADE:** No. Just with great thanks to -- to all participants. And it was a long day, but it was a productive day, and as I said, if other information comes available, please share with all involved, including the board, and then we'll see --

**MR. GRIFFON:** Did you put us on hold, Lew?

**DR. WADE**: What's that?

**MR. GRIFFON**: Did you put us on hold?

**DR. WADE**: No.

**MS. MUNN:** Somebody else did.

**DR. WADE:** Somebody else did but we can --

**MR. GRIFFON:** We got music.

**DR. WADE:** That's fine. You can use that music to play us off the stage.

**MR. GRIFFON:** Well, I -- I will offer also to update the matrix again for our next meeting prior to -- prior to the next meeting.

**DR. WADE:** Wanda --

**MR. GRIFFON:** I also would hope that -- don’t wait on me to update the matrix to -- to proceed on the action, because it could take a little while to sort these out and get them into a matrix format; but I will follow up on --

**MS. MUNN:** Thank you. You have all those items that can drop off now.

**DR. WADE:** Okay. I think we’re done.

**MS. MUNN:** We’ll see you in a couple weeks.

**DR. WADE:** See you soon. Be safe.

(Whereupon, the working group meeting was adjourned at 4:30 p.m.)

1 **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 March 28, 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 3rd day of May, 2006.

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**STEVEN RAY GREEN, CCR**

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