

UNITED STATES OF AMERICA
DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH

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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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TBD 6000 WORK GROUP

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WEDNESDAY
MARCH 28, 2012

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The Work Group convened in the
Brussels Room of the Cincinnati Airport
Marriott Hotel, 2395 Progress Drive, Hebron,
Kentucky, at 8:30 a.m., Paul L. Ziemer,
Chairman, presiding.

PRESENT:

PAUL L. ZIEMER, Chairman
JOSIE BEACH, Member
WANDA MUNN, Member

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ALSO PRESENT:

TED KATZ, Designated Federal Official
DAVE ALLEN, DCAS
ROBERT ANIGSTEIN, SC&A
JOHN DUTKO*
DAN CHUROVICH*
JENNY LIN, HHS
JOHN MAURO, SC&A
DAN McKEEL*
JAMES NETON, DCAS
JOHN RAMSPOTT*

*Present via telephone

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

2 (8:30 a.m.)

3 MR. KATZ: All right. Good
4 morning everybody in the room and on the line.

5 This is the Advisory Board on Radiation
6 Worker Health TBD-6000 Work Group. We're just
7 getting ready to go. We'll begin with roll
8 call. We are speaking about a site. So
9 please speak to conflict of interest. And
10 we'll do roll call beginning with Board
11 Members.

12 (Roll call.)

13 MR. KATZ: All right. We have an
14 agenda for the meeting. It is posted on the
15 NIOSH website and I believe there is some new
16 materials on the NIOSH website, too, to go
17 along with this meeting.

18 And it is your agenda, Paul.

19 CHAIRMAN ZIEMER: Okay, thank you.

20 We will officially call the meeting to order.

21 I want to take just a moment to
22 give us an overview of the agenda today and

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1 then we will proceed from there.

2 First of all we have an update
3 from NIOSH. Dave Allen has provided -- I'm
4 going to call it an update -- from his
5 previous White Paper on the betatron operation
6 model and that was distributed since our last
7 meeting and I believe the petitioners also
8 have a copy of that. And we will take a look
9 at that.

10 And then we have a document from
11 SC&A, which is kind of a summary document. It
12 is dated March 25th and it is called Review of
13 Addendum to Dose Estimates for Betatron
14 Operations White Paper. And that was
15 distributed to everyone. I believe the
16 petitioners also received that.

17 And then we have several documents
18 from the petitioners and I do intend for us to
19 look at those in some detail as well this
20 morning.

21 We have, I'm looking for the dates
22 on these, but we have actually several

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1 documents from Dan McKeel and the first of
2 these, and Dan you may have to help me here, I
3 have one which was the original critique of
4 the January White Paper and I want to use that
5 as well. And then we have the March 11th
6 document, which was previously distributed.

7 And we have some material from
8 March 27th, which was emailed and included
9 with that actually on March 23rd we have a
10 document called McKeel Response to Allen
11 Addendum 3, Part I, Items 1 and 2. And then
12 we have Part II comments. And then I believe,
13 Dan you put those all together into one
14 document that you re-circulated but I believe
15 those are the two most recent ones.

16 MR. ALLEN: That's correct.

17 CHAIRMAN ZIEMER: So we will have
18 a chance to look at all of those as well.

19 And then we have also distributed
20 by SC&A the latest updated matrix that has
21 been distributed and the matrix, I'm looking
22 for the date on that. It was within the past

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1 week. Everybody should have gotten that.
2 March 22nd. And we want to go through the
3 matrix in some detail as well and look at
4 those individual items.

5 So we have a good amount of work
6 before us today to get through all of these
7 items. My intent was that by the end of our
8 session we might be able to be in a position
9 to make a recommendation on the SEC petition
10 and we will have to see where we are at that
11 point because there are some new materials and
12 some new issues that have been raised. So we
13 will have to see how that develops.

14 So let's proceed first with the
15 update on the White Paper from Dave Allen.
16 And Dr. McKeel, let me certainly invite you if
17 you have comments or questions, as we proceed
18 you can raise those just as if you were here
19 at the table. I know you weren't able to
20 travel today but please don't hesitate to
21 raise questions as we proceed.

22 Okay, Dave, give us an overview of

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1 the update and modifications that you have
2 made.

3 MR. ALLEN: Okay. The addendum
4 that I put together was based on our last
5 meeting two weeks ago where some of the
6 information that came out and I was asked to
7 recalculate a few things.

8 The beginning of the paper
9 mentions the two issues that were the primary
10 reason for recalculating some of the dose and
11 that was that the lead was not in that double-
12 leaf door prior to 1968, during the covered
13 period.

14 And the second was the badges were
15 not stored in the control room but stored in a
16 badge rack that had been mentioned is in two
17 different locations. And I will address that
18 here shortly.

19 I put the map in there. One of
20 the two maps we had of the location of the
21 badge rack. And I recalculated the shot
22 scenarios based on where the badge rack is in

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1 this addendum as well as no lead in the door
2 and simply redid the calculations that we did
3 in the original White Paper.

4 And I also mentioned a handful of
5 other issues that had been raised that didn't
6 require recalculation of dose and why they
7 didn't.

8 And about halfway through there is
9 small header that says "Adjusted Values" and
10 that is the recalculated doses that I have put
11 together.

12 And then also towards the end Dr.
13 McKeel wanted, I would say requested or
14 suggested or whatever, that I put together an
15 example or some calculations associated with
16 what I was saying about the residual
17 radioactivity of the betatron machine itself.

18 Not much here that would be actually
19 favorable to include that. So the last part
20 of this was I just put together an example
21 calculation, starting with an assumption that
22 assumed you had five millirem each week from

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1 this residual activity. What would that mean
2 for the dose estimate? That is not the
3 estimate we intend to use. That is a what-if
4 example at the end of this.

5 And that is an overview. Would
6 you like more detail?

7 CHAIRMAN ZIEMER: Well perhaps we
8 could ask some questions and clarify some
9 issues.

10 Number one, there were two
11 locations identified for the badge racks. So
12 would you look at two different sets of
13 calculations or do those two locations affect
14 the outcome at all?

15 MR. ALLEN: The one I used is the
16 one that is in the figure in the addendum.
17 The two locations were that location and then
18 one in the office. If you look at the figure
19 I put in, it is somewhat close to where that
20 black area is, a little bit more to the left
21 of that.

22 My thought was that most of the

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1 radiation that is in the control room I
2 already knew. I am going to assume that the
3 rest of that area that most of the dose rate
4 is caused from what is coming through that
5 thinner wall in the tunnel there, the
6 scattered radiation, not the direct radiation
7 coming through the ten-foot chilled wall but
8 the thinner, 16-inch wall.

9 The location I chose is further
10 away from that wall. And in this case, that
11 gives you a more favorable estimate. Also
12 with the presentation that Dr. McKeel put out,
13 it said that that location was changed to the
14 hallway in 1964 and the bulk of the film badge
15 data we have come after that.

16 So in reality we have a little bit
17 before that. We don't know when in '64 or I
18 don't know when in '64 it was changed. But
19 the whole concept should work in both
20 locations because we have some data prior to
21 that movement, since we have starting in
22 January of '64 and we have some data after

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1 that movement.

2 So you could do this type of
3 calculations in both locations but this one
4 should have been more favorable.

5 CHAIRMAN ZIEMER: So the idea here
6 is that to use this location that results in a
7 higher value in the control room, if you back
8 calculate.

9 MR. ALLEN: It results in a higher
10 dose estimate for the layout.

11 CHAIRMAN ZIEMER: Oh, for the
12 layout people, which is the one that is going
13 to haul them away, drive it.

14 MR. ALLEN: Yes, because we are
15 basing it on ten millirem at the badge rack.
16 And the location I chose is a lower dose rate
17 at the badge rack than the other location.

18 CHAIRMAN ZIEMER: Okay, any
19 questions on that part of it?

20 Then --

21 DR. McKEEL: Dr. Ziemer?

22 CHAIRMAN ZIEMER: Yes?

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1 DR. McKEEL: This is Dan McKeel.

2 CHAIRMAN ZIEMER: Sure, Dan.

3 DR. McKEEL: I would just like to
4 make a clarification. What I actually said
5 was that the indication I had from the workers
6 was that that second position was changed
7 sometime between 1964 and 1966. I don't
8 really know when. I'm not sure they do
9 either. So I am just indicating that sometime
10 during the film badge period, when we had
11 badges, that location was changed. And it
12 certainly seemed to me and to the workers that
13 that second location was farther away from the
14 control room. So in effect, the badges
15 sitting there would get a lower dose compared
16 to what they were given in a more forward
17 position.

18 MR. ALLEN: Right. I might be
19 wrong which way you said. The location I
20 chose gets a lower dose rate --

21 CHAIRMAN ZIEMER: Because of the
22 walls plus distance or the walls and the

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1 distance both.

2 MR. ALLEN: Right, because the
3 bulk of the radiation in that vicinity is
4 coming through that thin wall. It is
5 scattered radiation coming through that 16-
6 inch block wall. This is quite a bit further
7 away than the other one. The other one is
8 actually fairly close to that 16-inch wall.

9 MEMBER BEACH: So you are using
10 the one that is closer, not the one that is
11 further away.

12 MR. ALLEN: It is further away
13 from the 16-inch wall and I think a little
14 closer to the ten-foot wall.

15 CHAIRMAN ZIEMER: Well I think he
16 is saying he is using the one that results in
17 the --

18 MEMBER BEACH: Highest dose.

19 CHAIRMAN ZIEMER: -- highest dose
20 to the layout workers.

21 MEMBER BEACH: Right.

22 CHAIRMAN ZIEMER: If you used the

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1 other one when you do the calculations, you
2 get lower dose to the workers.

3 MEMBER BEACH: That's what I
4 thought I heard.

5 DR. MAURO: Excuse me, Paul.

6 CHAIRMAN ZIEMER: Yes?

7 DR. MAURO: Would you mind, I've
8 been following this very closely. I have read
9 transcripts and all the material. And SC&A
10 has been putting out a lot of paper.

11 CHAIRMAN ZIEMER: Right.

12 DR. MAURO: And I find, one of the
13 things I often do is I try to step back and
14 say okay what do I see. And I would like to
15 express very briefly SC&A's position on this.
16 Well, SC&A's scientific position.

17 When all is said and done, all of
18 the material that has been distributed and
19 discussed I see as divided into two major
20 categories. The original radiography work
21 with the fish pole, the radium work, and the
22 betatron work. It is SC&A's position that --

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1 I'm going to make one qualifier -- that there
2 are no SEC issues associated with any of the
3 calculations dealing with the betatron. The
4 only question that Dr. McKeel raised that
5 really wasn't explored at the last meeting
6 that one could consider a possible SEC issue
7 is whether the betatron is a good tool, a
8 reliable tool that you could trust as a way to
9 reconstruct doses with sufficient accuracy,
10 given the fact that there are certain aspects
11 of the code that are still being so-called
12 beta tested.

13 But as far as we are concerned,
14 given that you accept the models as being
15 sufficiently accurate and reliable, SC&A's
16 position, there are no SEC issues associated
17 with any of the calculations, including
18 everything that we are talking about right
19 here. However, SC&A's position is there are
20 SEC issues associated with the radiographic
21 work that was done between 1952 or '53 and I
22 say right up to 1962 when the health physics

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1 program took hold with the AEC license.

2 So in order to just sort of -- I
3 know that the last transcript, I know one of
4 the statements that we made was that we were
5 trying to focus in on the SEC issues. That
6 really was the first priority. And I know
7 that we have been spending a lot of time on
8 matters like this which at least from SC&A's
9 perspective, use it as you see fit, are not
10 SEC issues. And I just wanted to put that on
11 the table early so you understand where SC&A
12 is coming from.

13 CHAIRMAN ZIEMER: Thanks John for
14 that comment. One of the reasons we are
15 spending a fair amount of time on some of
16 these issues is because there are questions
17 that the petitioners have raised that we need
18 to answer on their behalf so they understand
19 why you, SC&A, and NIOSH believe that dose can
20 be reconstructed for the betatrons as well as
21 other things that were used during at least
22 this time period here.

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1 One of the other questions with
2 the neutrons and the differences, I guess
3 again that had to do with assumptions made in
4 the modeling between SC&A and NIOSH but maybe
5 you could clarify because if we do dose
6 reconstruction you end up with a particular
7 model. And then the petitioners have raised
8 the question about why the doses appear to
9 have decreased on some of these such as the
10 neutrons. Maybe you could clarify that.

11 MR. ALLEN: Yes, the way the White
12 Paper was put together was to explore 15
13 different shot scenarios and then try to find
14 the combination of scenarios that would meet
15 the other criteria we have in ten millirem
16 badges, in this case at the badge rack, and
17 the utilization factor that we had in there
18 for how often it was actually on versus
19 setting up shots.

20 And with the photon dose for the
21 betatron operators, that scenario didn't
22 matter. For layout guide, it did. However,

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1 for the neutron dose, it was then based on the
2 timing of those shot scenarios.

3 So I think in both White Papers, I
4 mentioned how many hours each particular
5 scenario the Excel Solver came up with and
6 then the neutron dose rate times those hours
7 were essentially what I gave to the betatron
8 operators. When we changed the assumptions
9 like taking out lead door and moving the badge
10 rack, it changed dose scenarios and how many
11 hours and that changed the neutron dose.

12 That's essentially where we are at
13 those two. It is not a huge dose and fairly
14 small compared to the photon dose.

15 CHAIRMAN ZIEMER: Right. Any
16 questions, Board Members?

17 DR. McKEEL: Dr. Ziemer, this is
18 Dan McKeel.

19 CHAIRMAN ZIEMER: Yes, Dan?

20 DR. McKEEL: I have a comment and
21 it is a comment to what Dave Allen just said
22 and what Dr. Mauro just said.

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1 My concern about the betatron, I
2 don't think it has been adequately presented.

3 I'm going to try to present it today and with
4 a little bit more clarity. But just so
5 everybody is sure the way I feel about it, I
6 believe that what we have for both betatrons
7 is basically MCNPX modeling without any real
8 data to validate that model. And as I
9 expressed on 3/15, in my view a model, a
10 computer model, I don't care how sophisticated
11 the code may be, it can't be validated without
12 real data to validate it.

13 And I expressed then and still
14 feel today that an agreement between models
15 and real data, at least in the academic world,
16 is on the order of ten to 20 percent, not 200
17 percent.

18 And I also pointed out on 3/15 I
19 really would like it to be addressed today
20 specifically and not vaguely is that the SC&A
21 and the NIOSH models which Dr. Mauro did
22 complement one another and he had no problem

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1 with believing that the betatron dosage can be
2 calculated accurately. They don't agree with
3 each other between 2008 and 2012 and they
4 don't agree with each other that either of
5 those time periods are a factor of only
6 twofold. They differ from each other by a
7 factor of three to fivefold at the last
8 meeting. And I pointed that out in my slide
9 and that slide has been left with all of you.

10 So I will bring that up later on.

11 For the neutrons, the situation,
12 as far as I am concerned is much worse. There
13 is no real actual neutron data. The film
14 badges did not measure neutrons. So there is
15 no data of that type. There is no survey data
16 for either betatron building while the
17 betatrons were in operation. And we know that
18 the betatron beam consisted about 15 percent
19 give or take a little bit which the exact
20 fraction really has never been determined by
21 anyone here. But 15 percent is the number
22 that I have seen represented.

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1 So the betatron beam had a neutron
2 component to it and the most direct way to
3 measure that as everybody in the room knows,
4 is with Bonner sphere. And as far as I know,
5 not only is there no data like that at GSI,
6 but nobody has obtained any data like that
7 from another betatron site and there are lots
8 of Allis-Chalmers betatrons.

9 So I think you are saying a model
10 is validated basically by itself done by two
11 different organizations but not using
12 independent models. You know, it is Dave
13 Allen said several times at the March 15th
14 meeting that he used input files that SC&A
15 first developed for the betatron. And while I
16 understand the practical expediency of that,
17 that still doesn't constitute an independent
18 model.

19 So I just wanted to put that on
20 the record. I don't believe there is any real
21 betatron data to go by except for, we'll talk
22 about that I hope, the film badges themselves,

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1 which is very limited. I'll let it go at
2 that. Okay?

3 CHAIRMAN ZIEMER: Okay, thank you.

4 I don't know if either NIOSH or SC&A wants to
5 respond to those comments. Bob?

6 DR. ANIGSTEIN: Yes, I have
7 several responses to Dr. McKeel's comment.

8 First of all in terms of
9 validation, the MCNP code has been around for
10 decades I think, at least since the 1960s. It
11 has been validated innumerable times by
12 innumerable studies. All the aspects of the
13 code has been validated with the ones that I
14 have heard of or very closely corresponded
15 within two percent.

16 As far as this particular model is
17 concerned, because it was then -- because part
18 of our model was adopted by NIOSH, it puts us
19 in an unusual position because we had an
20 internal discussion about this by SC&A. Then
21 they asked to review its own model,
22 essentially. So we went to an outside expert,

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1 somebody who had worked for SC&A in the past
2 but had not ever done original calculations
3 for the NIOSH program, the OCAS program. He
4 had just done QA.

5 And he is Michael Mallard who is a
6 MCNP, Ph.D., CHP, has a been number of years
7 with Los Alamos, which is where the MCNP code
8 was first developed and still continues to be
9 under development.

10 He independently reviewed all the
11 assumptions, the input files, and he found
12 perfect agreement. Correction. He found a
13 transcription error of three thousandths of an
14 inch in one of the contours of the aluminum
15 columns in one spot on the periphery and the
16 machine tolerances were five thousandths of an
17 inch. So I consider that to be adequate
18 conformity.

19 In terms of the neutron component,
20 what Dr. McKeel I believe is referring to are
21 medical betatrons. Now it is the same tube
22 inside but the construction is very different.

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1 In medical facilities, space is limited. And
2 the primary concern is shielding against
3 photons. So the most effective photon shield
4 within reasonable cost is lead. So the
5 medical facilities use a lot of lead
6 shielding, which is very effective against
7 photons per inch or per linear inch of the
8 shield, but not very effective against
9 neutrons.

10 Whereas, at industrial facilities
11 such as GSI, they have a lot of space
12 available. They resort to more cheaper
13 material such as sand and concrete. So there
14 is first of all much more distance involved.
15 They don't come within the -- I forget what
16 the betatron shooting room is but it is on the
17 order of 50 to 100 feet. Yes, I do remember
18 it now. The numbers come back to me. Outer
19 dimensions are 97 feet in one direction, 112
20 feet in another direction. And also the sand
21 and concrete, lower atomic number materials
22 are actually more effective against neutrons.

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1 So the neutron-to-photon ratio is
2 very different for this industrial facility
3 than it would be for a medical facility. But
4 the measurements are not made right up close
5 to the betatron. They are made in occupied
6 areas where people have access while the
7 betatron is on. So that would account for the
8 difference in the neutron/photon ratio.

9 As far as the neutron generation,
10 that is done entirely within the MCNP model,
11 where the electron beam strikes at the target.

12 We have very accurate drawings of the
13 configuration of the target. The actual
14 design drawings, we reproduced them pretty
15 correctly in the MCNP input file. And what
16 happens is the electron beam hits the target.

17 Its primary purpose is to generate
18 bremsstrahlung photons. And at the same time,
19 because of the electronuclear interaction a 25
20 MeV electron hits a neutron, hits a nucleus,
21 where binding energies are on the order of ten
22 MeV, it liberates some neutrons.

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1 And again, the latest version of
2 the code uses the latest physics. I mean,
3 basically as I recall, I'm not quoting, the
4 regulation under which we are operating is the
5 82 point, federal guidance under which we are
6 operating says we should use the latest
7 science. Meaning, we should use this year's
8 science, not science ten years from now which
9 may very well advance but the current science.

10 And the current science is what is in the
11 latest release of the MCNPx code, where the
12 team, MCNPx development team, continuously
13 researches the literature and they construct
14 the cross-section and the data files, go
15 through every model, there are two components
16 at least. There is the algorithms, how do you
17 -- what are the physical laws governing a
18 certain interaction, in this case the high-
19 energy electron hitting the target and then
20 what numerical data do you use, do you input
21 into that model.

22 So the algorithm I don't think

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1 changes much but the numbers that you use, the
2 data gets updated periodically as new research
3 in physics gets published and evaluated and
4 accepted and they use the ENBSF, I believe it
5 is, the evaluated nuclear data file that is
6 maintained -- it is maintained at Brookhaven
7 National Laboratory but is essentially an
8 international collaboration to allow people
9 such as the MCNPx developers, among others, to
10 access the latest data. They don't have to
11 search the literature themselves. This is
12 already done by people, it is a full-time job,
13 who research the literature, evaluate it, when
14 they see there are findings, new publications
15 which meet the test of being acceptable, they
16 are incorporated into this file.

17 So I think we are using the very
18 latest and the very best science available to
19 do this.

20 CHAIRMAN ZIEMER: Thank you, Bob.

21 DR. McKEEL: Dr. Ziemer?

22 CHAIRMAN ZIEMER: Yes?

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1 DR. McKEEL: I must respond.
2 Because what I am saying is being misconstrued
3 and so let me put it another way.

4 In my opinion and I believe this
5 is the way it is, MCNPx or ATILLA, which NIOSH
6 first used to do their models, that is a tool.

7 It is a piece of computer software that does
8 many things but falls under the broad general
9 paradigm of transport code.

10 Now that tool, just like you would
11 use an electron microscope in my work or a
12 light microscope or a phase microscope, or a
13 differential interference microscope, they are
14 tools. And you apply those tools to a
15 particular model. And in this case, there
16 were many models with various source terms
17 that OCAS-IG-003 mandates must be all models
18 accurately, with sufficient accuracy to comply
19 with the mandate of the EEOICPA Act as
20 amended.

21 Now, then you apply the tool MCNPx
22 to a problem. And the problem is to model the

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1 betatron output doses for photons and neutrons
2 which should simplify things. That problem --
3 that the use of MCNPx the tool has to be
4 validated for that problem.

5 I agree that the code itself, the
6 lines of code, the subroutines, et cetera,
7 that they have been validated for other
8 problems I am sure many times. I have seen
9 many, many articles. But the point I am
10 trying to make is, and I have sent these to
11 the Work Group and the full Board and made
12 comments about them. There are many papers in
13 the literature where MCNPx, the tool, the
14 software tool is applied to a given problem
15 and then the investigator writes up a paper
16 and presents it to a peer-reviewed article or
17 journal to be published. And as part of that
18 submission, the peer-reviewed journals insist
19 that you have not only the model results with
20 the tool MCNPx but a real-world validation
21 that the values generated are accurate.

22 And for instance I sent you one

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1 where MCNPx was used to model neutrons. Well
2 the neutron real data is measured with Bonner
3 spheres. And I am saying we do not have any
4 kind of data like that for the betatrons.

5 So you know, we can go around and
6 around with this argument. I personally think
7 that the -- and to be honest with you, I
8 really want this to go before the entire
9 Board. The Board has previously ruled that
10 the radon model, for example, that was first
11 generated by SC&A, based on sound premises,
12 was not valid. And the full Board agreed with
13 that. The Work Group got deadlocked on it.
14 The full Board voted the radon model was not
15 valid.

16 So there is another example that
17 yes, the methodology was well-explained and so
18 forth and actually NIOSH and SC&A both agreed
19 that it was a good model but the Board
20 rejected it. I am asking the Board to do the
21 same thing now based on the same kind of
22 reasoning. That there is no measured real

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1 data against which to validate this particular
2 use of the MCNPx software tool.

3 And I think I will let it go at
4 that.

5 CHAIRMAN ZIEMER: Okay, let me add
6 a comment here that typically one does not use
7 the system that you are trying to model to
8 validate the modeling approach. That would be
9 a circular argument.

10 The MCNP model has been
11 independently validated against other systems.

12 It would be like if I want to calibrate a
13 balance, I don't use the weights that have
14 been weighed on that balance to calibrate the
15 balance. I have to have those weights
16 independently calibrated. And that is, I
17 think the argument you are making. It sounds
18 --

19 DR. McKEEL: No. No, that is not
20 the argument I am making. I understand that.
21 I agree with you.

22 CHAIRMAN ZIEMER: Well the only

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1 reason for using the model is because you
2 don't have the data. We don't have Bonner
3 sphere data for this.

4 DR. McKEEL: That's exactly right.

5 CHAIRMAN ZIEMER: And that is why
6 you use the model, that is the MCNP code to
7 generate the information because the physics
8 of it are very well known. We have the
9 information about the beam. We know the
10 energies. So we have the known basic data
11 from the operation. Then the code, which has
12 been validated independently then generates
13 the information about the photon and neutron
14 output.

15 DR. McKEEL: Well let me ask you a
16 question then.

17 CHAIRMAN ZIEMER: If I already
18 have Bonner sphere measurements for these
19 beams, I wouldn't need to use that code.
20 That's the only point I'm making.

21 DR. McKEEL: All right. Well, let
22 me ask you a direct question.

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1 CHAIRMAN ZIEMER: Yes.

2 DR. McKEEL: Are you aware of any
3 paper in the literature published ever that
4 has used MCNPx to model an Allis-Chalmers 24
5 to 25 MeV betatron?

6 CHAIRMAN ZIEMER: I'm not
7 personally but I haven't looked for one.

8 DR. McKEEL: Has anybody ever seen
9 such a paper?

10 DR. ANIGSTEIN: I'm not aware of
11 it. Probably one reason would be that there
12 are only in the United States two operating.
13 The last I heard, there were two operating
14 Allis-Chalmers 25 MeV betatrons. This is a
15 tool that is now obsolete. It has been
16 replaced by a much newer --

17 DR. McKEEL: Dr. Anigstein, these
18 machines have been out in the marketplace and
19 used for 40 years. And there are betatrons --
20 no. The betatron model itself is not at all
21 obsolete. There are betatrons being sold
22 today generally in the six to ten MeV range

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1 that are portable and are used widely for NDT
2 work. So there is plenty of opportunity to
3 have such papers appear in the literature.
4 I'm just not aware that I have ever seen one.

5 And I am calling on everybody this
6 morning. If you have seen one, please tell me
7 what it is. Put it on the record.

8 I'm saying there is no -- there is
9 a principle in science that things are not
10 accepted unless they are replicated. And I am
11 saying that this is a first issue.

12 And going back to Paul's analogy
13 about the weight, yes he used a weight that is
14 calibrated by the National Bureau of Standards
15 but what you actually do when you put
16 something on that scale is you are using it to
17 calibrate the scale. So if you put a ten-gram
18 weight on there and the balance shows it
19 weighs 20 grams, then that balance is not
20 validated. And that is what I am trying to
21 tell you, that there is no National Bureau of
22 Standards gold standard. There is a code

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1 which has been validated but it has not been
2 validated for measuring betatrons and its
3 output. And I would also just like to put on
4 the record right now that the model that is
5 used by both SC&A and NIOSH is very
6 simplistic. The betatron have a lot of other
7 components to its radiation emissions.

8 For example, there has never been
9 any modeling of the leakage from the beam from
10 the machine itself. Not from the cone but
11 through the column itself.

12 In the earliest days when I worked
13 with an electron microscope, which is really
14 an electron particle accelerator that sends
15 the beam down and bounces off a target that
16 you visualize to examine usually biologic
17 tissues or very thinly cut materials. And
18 those machines from the beginning had inherent
19 leakage. They were much lower voltage, you
20 know, 50, 100 keV but there was leakage
21 through the columns. None of that has been
22 quantified in this entire exercise over these

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1 four years. And it is very naive not to do
2 that.

3 So you know, this model is a
4 simple model of how a betatron would operate.

5 And it is not productive to carry this
6 forward anymore other than to say I don't
7 believe that you have real-world data to
8 validate this model.

9 I'll just let it go at that.

10 CHAIRMAN ZIEMER: Okay, thank you.

11 John has a comment, John Mauro.

12 DR. MAURO: I just want to point
13 out that I understand what Dr. McKeel is
14 saying. And quite frankly, recently I have
15 been engaged in a similar type of situation
16 where a company was designing an accelerator
17 for medical purposes and they were putting in
18 place the tech specs, the design. All the
19 physics was done, all the shielding was laid
20 out. The whole program was put in place. And
21 all the modeling was done to predict the
22 fields with and without the patient, that sort

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1 of thing.

2 And one of the tech specs, just as
3 far as operations go, is that once a year
4 their license to operate this requires a team
5 to come in with the machine on and take
6 measurements at various locations outside the
7 envelope, the shielded envelope, to see in
8 fact if there is any leakage or is any
9 surprises.

10 So I would say to take the side of
11 Dr. McKeel to a certain degree, yes. One of
12 the things for defense in depth you do at
13 least in the medical community today is to
14 confirm that the machine is in fact performing
15 as designed and as originally tested when it
16 was installed and then annually come in.

17 Now, a thought that came to mind
18 is that we did not talk about, the degree to
19 which these types of annual tests might have
20 been performed. It sounds like perhaps they
21 weren't. I don't know. It is not so much --
22 You know, is the machine performing the way it

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1 was originally designed and spec'ed for? I
2 guess we haven't had that conversation and it
3 is a legitimate question. It is something
4 that is done today. To the degree to which it
5 wasn't done, how serious a challenge is that
6 to our ability to reconstruct doses is
7 certainly a legitimate question. So I think
8 that out of this conversation comes that
9 legitimate question.

10 DR. McKEEL: Dr. Mauro, I
11 appreciate that support. And I would just
12 like to point out that a long time ago John
13 Ramspott and I pointed out to you all that '
14 identifying information redacted', the paid
15 consultant that NIOSH CDC used to get
16 information about the residual radiation from
17 the betatron once -- I mean his first job was
18 with Allis-Chalmers. And ' identifying
19 information redacted', who John and I
20 interviewed personally face-to-face in
21 Wisconsin who since John has talked to a
22 number of times, told us that in the early

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1 days every single Allis-Chalmers betatron
2 installation was, upon installation by Allis-
3 Chalmers, or Picker, or whoever was doing the
4 installation, there are only a few people that
5 could do those installations, that they made a
6 formal survey of the betatron facility.

7 And of course as soon as I heard
8 that, I said oh, that is fantastic. I said,
9 so 'identifying information redacted' do you
10 have any of those? And 'identifying
11 information redacted' had said at the
12 beginning that he bought the access the West
13 Allis/Allis-Chalmers betatron group when it
14 went out business and stopped selling and
15 making betatrons. 'identifying information
16 redacted' said well he had them for a little
17 while and then because of space limitations
18 for his filing, he destroyed them. He threw
19 them all away.

20 Now that is 'identifying
21 information redacted'. That is one person.
22 That is the copies he had. But what I am

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1 saying is there were dozens and dozens of
2 Allis-Chalmers betatrons scattered around the
3 country, including in hospitals in St. Louis
4 and other places.

5 And so as far as I am aware, that
6 information was out there. At least the maker
7 of the betatrons thought it was important not
8 to survey the building at the outset. We
9 don't have that data. We don't have that data
10 for any betatron facility, even though there
11 are many.

12 And the other thing I want to say
13 is that I was not talking about medical
14 betatrons. Some of the papers have to do with
15 medical betatrons back in the days of the
16 industrial betatron used at GSI and similar
17 facilities.

18 You know, I ran across recently a
19 paper that John had showed me before on
20 decommissioning accelerators and among the
21 five examples there they gave a 22 MeV linac
22 that had been decommissioned. And in the

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1 table that accompanied that, they listed four
2 betatrons in that dose range and a little bit
3 higher that had been junked at Los Alamos.

4 So Los Alamos is a covered site.
5 It has SECs. There has been extensive
6 information about it. I'm sure that that
7 would be a terrific source to go and look for
8 betatron facility measurements, real-world
9 measurements. You know, if they didn't do it,
10 then there is something very, very wrong.

11 We rely on the Los Alamos betatron
12 manual for comments about safety, the safety
13 program at GSI. So I think the data is out
14 there. I think Dr. Mauro is right. I think
15 in the early 1950s, the manufacturer realized
16 that these machines had to be -- the radiation
17 flux field had to be measured and quantified.

18 And I think it is a terrible shame that those
19 data have not been preserved and have not been
20 found. They must exist.

21 So yes, the fact that there are
22 not very many betatrons, the betatron we saw

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1 in 2006 at West Allis crashed to the ground.
2 And so they now have a 6 MeV linac in there
3 now.

4 But the other point about the
5 industrial betatron that we need to talk about
6 as far as leakage, they were not as well
7 shielded either as our modern or then medical
8 betatron. So you know, that would mean, I
9 think, that the leakage from the columns in
10 the machine itself was probably greater than
11 the medical ones and there was even more need.

12 But as you all well know from dozens of
13 sites, you know, safety precautions gave way
14 to financial expediency and concerns about
15 liabilities that management had at many of
16 these sites. And there was a rush. There was
17 a national urgency to get the job done.

18 So all of those things figure into
19 the equation but I'm just arguing we do not
20 have all of the data that was available on
21 betatrons, that probably still is available on
22 betatrons, to characterize the radiation field

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1 that it gives off in any other than a very
2 simplistic way.

3 So, I'll let it go at that.

4 CHAIRMAN ZIEMER: Okay, thanks.

5 MR. RAMSPOTT: Dr. Ziemer?

6 CHAIRMAN ZIEMER: Yes John, go
7 ahead.

8 MR. RAMSPOTT: Yes, if I could
9 make a brief comment.

10 CHAIRMAN ZIEMER: Yes.

11 MR. RAMSPOTT: We have done a lot
12 of homework on the betatrons and when you
13 start looking at MCNPx and betatrons, the most
14 common names you see is Dan McKeel and John
15 Ramspott, at Los Alamos. There was not much
16 investigation of what a betatron would do.
17 And I totally respect some of these codes.
18 They are very reputable, honorable. You
19 didn't look at a betatron. That is the
20 problem.

21 And then the second half of this
22 actually lends to what Dr. Mauro was just

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1 talking about he is doing an extensive study
2 and the big problem you have that I think is
3 an SEC issue at GSI, betatron. You're right.

4 You say you know the energy and you know the
5 spectrum. You don't know what they examined
6 with it, though. That is the problem. There
7 is no shot records. You don't know if they
8 were looking at a piece of uranium or if they
9 were looking at a massive casting.

10 And at the meeting in St. Louis
11 about four years ago, I clarified and I had
12 members of the Board actually confirm for me
13 that there are three sources of neutrons when
14 a betatron fires off. The target, I heard the
15 target discussed. Dr. Anigstein talked about
16 the target and that was one. But the casting
17 itself without neutrons, 15 percent of the
18 beam is neutrons. And everybody keeps talking
19 about the target. That is one little piece of
20 the pie.

21 But the main thing I think that
22 causes you problems that you don't have enough

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1 information for sufficient accuracy of any
2 doses is what did they use the betatron on?
3 How much did they use the betatron versus the
4 sources? Those are big issues. We are not
5 just talking about a hardware issue. We are
6 talking about the actual material that was x-
7 rayed. And then what happens?

8 You don't see much in any
9 literature of the what happens. That is just
10 the quick comment I would like to make. Thank
11 you.

12 CHAIRMAN ZIEMER: Okay, thanks.
13 And Bob has a comment.

14 DR. ANIGSTEIN: Yes, I have got a
15 number of comments I have been accumulating
16 while the discussion was going on.

17 Going back earlier to Dr. McKeel,
18 the use of models in physics. If every
19 calculation had to be validated, then there
20 would be no point in having calculations.
21 There will be no point in doing theoretical
22 physics. As a nuclear physicist, the purpose

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1 of experiments in physics are always to
2 confirm or question an existing theory. Not
3 the other way around. The theory is not there
4 to supplement the experiment. The experiment
5 is there to supplement the theory. Otherwise,
6 all theoretical physicists should retire and
7 only technicians should be working in physics
8 and competent technicians making measurements
9 and recording the data. That is not the way
10 science works. Science is built on theory and
11 the observations and the experiments are there
12 to validate the theory.

13 If every single prediction had to
14 be validated, if we had to predict -- well I
15 can go on with some trivial examples, which I
16 won't bother.

17 Secondly, this business about the
18 neutron. There was a mistake in conception of
19 what fraction of the beam is neutrons. The
20 beam is not neutrons. The beam is the
21 bremsstrahlung radiation, which means a high
22 energy electron hits a target and it is

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1 suddenly stopped. And bremsstrahlung is
2 German for braking radiation; braking B-R-A
3 like the brakes on a car. And with that high
4 energy, it is predominantly going forward. So
5 you have an intense beam going to the front
6 but not entirely. It spreads out to the right
7 of the -- you could draw a whole spectrum over
8 the angles. As you get further away and
9 further away from forward direction, it drops
10 off.

11 Now the neutrons are generated by
12 entirely different mechanisms. They are
13 generated by an activated, briefly activated
14 nucleus of the platinum atoms. And it is
15 essentially isotropic, meaning it goes on all
16 directions. So depending in what orientation
17 you are to the betatron, you will get a
18 different neutron-to-photon ratio. Then in
19 terms of leakage, leakage when it applies to
20 let's say an x-ray tube, which is how in the
21 heavily shielded housing and is supposed to
22 only be going in a forward direction but in

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1 reality internally, x-rays go in all
2 directions. And how well the head is shielded
3 in terms of the leakage, if there is a crack
4 in the lead or the lead is made in more than
5 one piece, and they are not properly drawing
6 together, you will have leakage.

7 This concept does not apply to the
8 betatron. The betatron is actually extremely
9 simple. Dr. McKeel said simplistic. It is
10 not simplistic. It is simple. It is a very
11 simple matter of a high energy electron, I
12 mean how you get the electrons to get into the
13 beam, how you get them into the electron, how
14 you get them to go into the storage ring and
15 stay, that is very complicated physics. But
16 that does not generate any appreciable
17 external radiation. The external radiation is
18 generated when it hits the target and it goes
19 forward.

20 And yes, we did not include all of
21 the components but we don't need them. And if
22 we put in other components, there would simply

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1 be additional shielding. By leaving it out,
2 it becomes, we maximize the exposure. We make
3 it more claimant-favorable, if you will, by
4 increasing the exposure rate and a dose rate
5 in various external locations.

6 Then furthermore, as far as Los
7 Alamos, my colleague Richard Olsher who worked
8 on these MCNP calculations, he was actually my
9 instructor -- I took a course at Los Alamos
10 ten years ago, almost 11 years ago on the MCNP
11 code -- actually and this is documented, it is
12 in my report, he actually was at that point
13 responsible. He was the health physicist
14 responsible for radiation safety and that
15 included the betatron. And he asked to make a
16 measurement inside the betatron room and he
17 was told, well policy is you shouldn't go in
18 for five minutes -- he said for a couple of
19 minutes. He went in five minutes later to
20 check the betatron. He could not measure any
21 radiation in that room five minutes after the
22 betatron was shut off.

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1 So this calls into question Mr. ' `'
2 identifying information redacted''s
3 observation that it took 15 minutes for it to
4 die down. And it was an Allis-Chalmers
5 betatron, maybe slightly lower voltage at that
6 time. Originally their standard model was 22
7 MeV and then they gradually improved the
8 circuitry by putting a capacitor back or
9 something and they were able to get it up to
10 25. It was basically the same tube.

11 So that again contradicts. We
12 have one -- I mean if you want to talk about
13 scientific validity, you have one recollection
14 from Mr. ' ` identifying information redacted'
15 many, many years later. He had no notebooks.
16 He had no data to prove it. It was not
17 confirmed. This was something he recollected.
18 We take it for what it is worth. We don't
19 dispute it but the fact is if there was that
20 kind of radiation, the workers' film badges
21 would have shown it.

22 CHAIRMAN ZIEMER: Well, stick to

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1 the issue of the model.

2 DR. ANIGSTEIN: Okay. But I think
3 this is as, in my opinion, this is about as
4 robust a model as you will find. And the fact
5 that it has not been specifically validated
6 for an Allis-Chalmers betatron, the opinion of
7 experts such as my colleagues with the MCNP
8 specialist does not invalidate it.

9 CHAIRMAN ZIEMER: What you are
10 saying about the neutrons in terms of the way
11 you modeled it, if you had put samples in the
12 beam, as John Ramspott suggested, what would
13 that do to the --

14 DR. ANIGSTEIN: Oh. The neutron
15 emission included the emission of neutrons
16 from the target because that is one of the
17 capabilities of the code, which has now been
18 finally finalized, you would say, word I don't
19 like to use. I mean, the code is now in the
20 public domain.

21 Earlier in 2008 we are using an
22 early version of the code that was still under

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1 development.

2 Oh yes, and the differences Dr.
3 McKeel pointed out between 2008 and 2012.
4 First of all, we changed -- we had a new
5 drawing. We found a drawing of the new
6 betatron building in this 1968 application for
7 the cobalt-60 -- the 80-curie cobalt-60 source
8 and so these were much more detailed. They
9 were done on the spot by the people doing the
10 radiation safety surveys. They had
11 dimensions. They were hand-drawn. They were
12 not, I wouldn't call it engineering drawings.
13 They were not exactly to scale but the
14 dimensions were listed. The material of the
15 walls was carefully described.

16 And so we changed it from what we
17 had originally were the FUSRAP reports where
18 they had no interest in those kind of things.

19 And it was simply a scale drawing. They gave
20 no dimension. They say well you put a scale
21 there and I had to go on the computer and
22 calculate well this distance is so many pixels

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1 on my graphics program and that corresponds to
2 so many feet in doing a translation. So it is
3 not surprising that the dimensions would have
4 changed somewhat. There was a wall that
5 wasn't there earlier. I'm just saying earlier
6 in terms of our time, later in terms of when
7 the drawing was produced. They probably, they
8 most likely had knocked down a wall.

9 CHAIRMAN ZIEMER: Well bottom line
10 on the targets. So let's --

11 DR. ANIGSTEIN: So on the targets,
12 yes we picked the HY-80 steel, which we were
13 told by the metallurgist that was part of the
14 group of workers who we interviewed back in
15 2007 and the gentleman is recently deceased,
16 who had a very clear knowledge. He even lent
17 me some datasheets on this HY-80 steel. They
18 had HY-80. They had something called HY-100,
19 which turned out to be mostly the physical
20 characteristics were a little different. The
21 chemical composition was almost identical. He
22 also said that they used I think it was a

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1 high-manganese steel, if I remember correctly,
2 which we also modeled back in 2008 and didn't
3 find very much difference. It is not highly
4 sensitive to the details of what particular
5 alloy. Yes, there are differences. And what
6 at least SC&A has done with the model that
7 SC&A is proposing for the layout man, is a
8 maximizing model. And this is, in our
9 opinion, the highest plausible dose that a
10 person working in that location could get over
11 a period of a year. Not any particular hour
12 or any particular minute. But if you take it
13 over a period of a year, they are not always
14 going to use a casting that would give you the
15 absolute highest possible emission and in the
16 worst possible location and the worker being
17 in the worst possible location. That is just
18 not plausible.

19 What we have is an upper bound
20 which in all honesty it is probably a way over
21 statement. I don't think anyone would have
22 been in that position all year long with a

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1 casting in that position. But this is an
2 upper bound which is highly unlikely. We are
3 not working at 100 percent certainty. The
4 criteria, like in the IREP code is the 99th
5 percentile and NIOSH has often used like the
6 95th percentile individual to be sufficient
7 bounding. At that level, it is confident that
8 this would not have been exceeded. Once in a
9 million, maybe, but on the order of one in a
10 100 or five in a hundred, highly unlikely that
11 the dose that we calculate would have been
12 exceeded.

13 CHAIRMAN ZIEMER: Okay. Any other
14 comments on that issue? We have Dr. McKeel's
15 concerns. We understand what SC&A has done.

16 The only other issue on this, I
17 guess, is the differences in the numbers that
18 SC&A generated versus NIOSH. And in both
19 cases, as I understand it you are using that
20 as examples. But is there an agreed-upon --
21 If you were to use this in dose
22 reconstruction, is there an agreed-upon

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1 distribution such as NIOSH developed with your
2 what was it called, that optimizing code --

3 MR. ALLEN: The Solver.

4 CHAIRMAN ZIEMER: -- the Solver;
5 the Solver approach. And SC&A look at that
6 approach. And does that make sense to you
7 guys?

8 If one were to accept the modeling
9 approach, is that Solver --

10 MR. ALLEN: I think that is where
11 the disagreement is right now, if I am not
12 mistaken.

13 I don't know if SC&A has a problem
14 with the Solver or not but to put words in
15 Bob's mouth here, you can correct me if I am
16 wrong, what he has written is he takes some
17 issue with the scenarios that I put together
18 and the -- well I think you mentioned the
19 location of the badge rack, too.

20 DR. NETON: It was the modeling of
21 the badge rack.

22 DR. ANIGSTEIN: I have -- I mean I

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1 am ready whenever we are ready --

2 CHAIRMAN ZIEMER: Let me see. Let
3 me see if there is any other question on --

4 DR. NETON: I think as a basic
5 approach, can we reconcile the exposures using
6 the available film badge data, using Dave's
7 model versus the SC&A model --

8 CHAIRMAN ZIEMER: Right.

9 DR. NETON: -- which doesn't take
10 that into account at all and just comes up
11 with a worst-case shot scenario to the layout
12 man regardless of what the badge readings have
13 produced. That is the difference.

14 So there is no doubt SC&A's model
15 has the higher values.

16 CHAIRMAN ZIEMER: So your model,
17 you didn't normalize to the value.

18 DR. ANIGSTEIN: Let me -- can I --

19 CHAIRMAN ZIEMER: Yes, go ahead.

20 DR. ANIGSTEIN: It would be easier
21 if I could make my presentation. That will
22 answer the question.

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1 DR. MAURO: You realize that we
2 are talking about an issue that goes toward
3 what is the best way to do that that is
4 plausible and claimant-favorable.

5 CHAIRMAN ZIEMER: Right.

6 DR. MAURO: We are not
7 challenging. This is not an SEC issue. This
8 is purely --

9 CHAIRMAN ZIEMER: Yes, I
10 understand that.

11 DR. MAURO: I mean, it is very
12 important because it is so easy to find
13 yourself going down a pathway. We spent a lot
14 of time --

15 CHAIRMAN ZIEMER: Well it becomes
16 an SEC issue if in fact one concludes that you
17 can't bound. So you have to talk about can
18 you bound the dose.

19 DR. MAURO: Yes. Okay, I guess I
20 leaped forward. I thought that someplace in
21 this discussion is scientific agreement on
22 what is the best way to bound a dose. But it

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1 is there. It is just a matter of the
2 judgments being made.

3 CHAIRMAN ZIEMER: Right. But I
4 think both of you have said you believe you
5 can bound the dose. You just have to convince
6 the Work Group that you can bound the dose.
7 And I think we are also listening to the
8 petitioner, who is challenging whether or not
9 this approach bounds the dose.

10 So I want to get all the parts on
11 the table.

12 DR. McKEEL: Dr. Ziemer, this is
13 Dan McKeel.

14 CHAIRMAN ZIEMER: Yes?

15 DR. McKEEL: A very short thing.
16 I want to put on the record the concluding
17 paragraph to Dr. Anigstein's four-page review
18 of Dave Allen's work. And you know, this is
19 really not the same that I am going to read to
20 you as what he has said in this room today.

21 It says, "In summary, we conclude
22 that the analyses presented by Allen (2012a

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1 and 2012b) represent a major advance over the
2 betatron studies described by Allen and Glover
3 in 2007. However, we believe that further
4 revisions are required in order for the
5 results to be scientifically correct and
6 claimant-favorable." And we are not hearing
7 that this morning. We are hearing that NIOSH
8 and SC&A agree and that doesn't square with
9 what is written down on this piece of paper.

10 CHAIRMAN ZIEMER: No, I don't
11 think that is what they said. Both of them
12 said that they agree that it can be bounded
13 but where they disagree is on exactly what you
14 just read and I think Bob is going to go
15 through that now for us.

16 DR. McKEEL: Okay.

17 CHAIRMAN ZIEMER: It has to do
18 with the issue of what constitutes a claimant-
19 favorable bounding, if this approach is used.

20 Bob.

21 DR. ANIGSTEIN: Okay, thank you.

22 CHAIRMAN ZIEMER: And just for

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1 those on the phone, Bob has some slides that
2 he is presenting here which I think summarize
3 what is in the paper, I believe.

4 DR. ANIGSTEIN: Correct.
5 Summarize and amplify.

6 CHAIRMAN ZIEMER: I suppose after
7 Jenny Lin looks at these, we can probably make
8 these slides available also to the folks on
9 the phone. We can email them at some point.

10 MR. KATZ: If you send them to me
11 I'll distribute them to everyone, including
12 Dr. McKeel and John Ramspott.

13 DR. ANIGSTEIN: Well first of all,
14 I want to -- this is reproducing from my
15 previous report and Dave has included that in
16 his report where --

17 CHAIRMAN ZIEMER: This is, for
18 those on the phone, we are looking at the
19 diagram that also appears on page two of Dave
20 Allen's report. It is the diagram of the new
21 betatron building showing the film badge rack
22 location.

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1 DR. ANIGSTEIN: Right. So this is
2 basic information I got from one of the
3 betatron operators I spoke to. And so this is
4 where, this is the basis of -- I'm really
5 presenting Dave Allen's work. This is the
6 basis of Dave Allen's work.

7 However, here is the model from
8 the MCNP file that Dave Allen kindly shared
9 with me and the critique I have here is, here
10 is the building. Here are interior walls
11 according to, again, recent information passed
12 on by Dr. McKeel from one of the workers.
13 There is all kinds of equipment here, which I
14 would expect. Even I would assume that
15 without being told specifically. And Dave's
16 model, if he'll forgive me for saying this, is
17 empty space.

18 There is a wall here which utilize
19 the wall, the density of the concrete from the
20 2008 SC&A report where we have no knowledge as
21 to what this wall is made of and, therefore,
22 assume the most, what in that aspect, was the

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1 most claimant-favorable. We are taking the
2 betatron being here. We are saying workers,
3 the betatron operators are spending their time
4 in the control room here. So the less
5 shielding there is, the higher their doses
6 would be. That was before we had the film --
7 before we knew there was a film badge there.
8 We were just modeling. Everything was being
9 calculated on the basis of a model.

10 So I simply went to the current
11 commercial literature, the internet naturally,
12 and found a building block that was 16 inches
13 wide or long. We were told the wall is 16
14 inches and that was mostly hollow. And I
15 found the one with the lowest average bulk
16 density. You take all the blocks, put them
17 together, how many pounds per cubic foot do
18 you have. Very light material. Density was
19 like 0.92, which is lighter than the density,
20 was less than the density of water.

21 Since then we learned from the
22 material in the AEC application that these

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1 walls were mortar-filled, were heavy. As a
2 matter of fact, in some independent modeling
3 of the cobalt-60 source, I started off with
4 some very lightweight material, the same
5 lightweight material here knowing any better,
6 and I got rather high dose rates outside,
7 which were completely inconsistent with the
8 survey results. So I said no, this wasn't
9 light. They used heavy-duty concrete. They
10 used the concrete such as was recommended by
11 Allis Chalmers because they were interested in
12 radiation and they assumed they knew what they
13 were doing.

14 So here, according to Dave Allen's
15 approach, using Dave Allen's approach, the
16 less shielding there is, the less dose is a
17 sign because the more dose is a sign to this
18 control badge which he assumes is located here
19 at the badge rack.

20 In my opinion, SC&A's opinion,
21 speaking for SC&A now, this report is just not
22 valid. We just don't know enough about where

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1 the control badges were stored. We don't know
2 anything about it or enough information about
3 the intervening equipment here so that the
4 calculations for any individual shot scenario,
5 the calculation of the exposure rate at the
6 badge rack is not claimant-favorable.

7 So we propose that this approach
8 not be used when I had a problem with the
9 Excel Solver. I made a comment in my previous
10 report which I would like to retract. I
11 really didn't understand how it was being used
12 at that time. There is nothing wrong in
13 theory with that approach. But in this
14 application, I think it would make more sense
15 to simply say we have -- pick a scenario. It
16 is a little arbitrary but then the 15
17 scenarios, the NIOSH scenarios are also
18 arbitrary.

19 Pick a scenario we know happened.

20 We were told specifically that this
21 particular casting, there it is, photographic
22 evidence it is in the betatron room. This

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1 one, by the way, this particular one is not on
2 the railroad tracks. It is often in a far
3 corner of the room, as it should be. My guess
4 is that the control room is probably off in
5 this direction and this is shooting away from
6 the control room in the described manner. But
7 again, the same betatron operator that
8 furnished much of the information did say at
9 the meeting that there were four such axles
10 and at least one of them was shot on the
11 railroad track. So it was an occasional
12 scenario. He also said that he thought of
13 maybe 15 percent of the shots were in that
14 location.

15 So again, we are taking by saying
16 we are using that to say all of them were
17 there. It is a bounding and it is less, it is
18 more robust. It is less of these things well
19 is it, you know, where is the exact location
20 of the film badge rack. What is the exact --
21 how much dose was received by the control
22 badges? I think that this is a more plausible

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1 bounding.

2 Then I want go on to what Dr.
3 McKeel didn't mention but passed on at the
4 last minute correspondence we got just before
5 and he said this is pointing out that this is
6 the aerial view of the locations and this is
7 the main part of the betatron building. Here
8 are the offices and also the rail tunnel going
9 into the building is here. Then there is
10 another roofed connection from the betatron --
11 this is the betatron building proper and here
12 is this little structure which passes right
13 into the Number 10 Finishing Building, and the
14 railcars pass through here into the betatron
15 room.

16 And this is my model of that
17 shooting scenario that I just described. So
18 this is the betatron itself. If we blew it
19 way up, you would see the detail, however in
20 this scale you don't. This is the casting,
21 these two lines because it is, you know, you
22 are going to have a horizontal cylinder and

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1 you are taking a cut through it so you only
2 see the two sides.

3 And we put the layout man in
4 different locations. He is not going to be
5 right on the railroad track because then he
6 will be blocking all further traffic into the
7 room. So he is going to be one side of the
8 other. Put him ten feet to allow room for the
9 casting on either side of the railroad track.

10 It turned out that this location on this side
11 was the much higher, almost a factor of two
12 higher than the other location. So the center
13 location will probably be somewhere in-
14 between.

15 The reason this is maximizing if
16 you can draw, I wish I could draw on this but
17 I can't, the line of sight. This is the
18 actual betatron target. This layout man, if
19 he could look in, could actually see the
20 betatron tube. Of course, it is encased in a
21 big housing, everything else. But in this
22 simplified model, the radiation goes in all

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1 directions. Now very strongly peaked in a
2 forward direction but there is still some.
3 But he is actually getting direct radiation
4 from the betatron, not even from the casting
5 because he can probably, he may or may not be
6 within line of sight of the casting, probably
7 not. But this is as bad as it can get and
8 still be realistic.

9 Now the point that was raised was
10 they found another worker who said well,
11 sometimes they were in a hurry to mark up the
12 casting. So they would take this casting
13 which is still sitting on the railcar. The
14 reason they left it on the railcar again is to
15 save time rather than use a crane to move it
16 in and out. And they moved the casting out to
17 here. This is where this legendary ribbon
18 door is. It is not showing on my diagram
19 because it is such a, on this scale, it is
20 really in there but it is one-sixteenth of an
21 inch thick so it just doesn't show up on this
22 scale.

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1 So say they were just past it.
2 Well they wouldn't be leaning against that,
3 press their bodies against the door to be
4 working on a casting which would be out here
5 somewhere. They would be somewhere near that
6 ribbon door. It will be nearer than this
7 position, which is inside the 10 Building. It
8 could be about here. Here is a scale in
9 centimeters. So this distance is just about
10 1200 centimeters, 12 meters, which is roughly
11 speaking about 40 feet. So he is about 40
12 feet outside this ribbon door. So they could
13 be maybe ten feet outside the ribbon door.
14 The casting is located near there.

15 Yes, however, there was a catch to
16 this. They cannot be working on a casting
17 that is on this railroad track and
18 simultaneously have a casting on the railroad
19 track inside the betatron building. The
20 reason for working on this casting in this
21 location would be so they could quickly move
22 it into the betatron building. Well they

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1 can't move it into the betatron building if
2 there is already a railcar there with a
3 casting.

4 So even though while this layout
5 man is working, say, in this location, layout
6 crew, there would be more than one man doing
7 this at a time, and the betatron operator said
8 well let's not waste time waiting for them;
9 let's do something else. They would be doing
10 a radiography on a casting somewhere in the
11 normal region of the building here.

12 And here they would be shielded by
13 -- the direct line of sight would be have to
14 pass through these ten-foot thick walls and
15 the radiation here from that source would be
16 far smaller than the radiation in this
17 location. So regardless of this new
18 information, this is still the limiting
19 bounding scenario. And that is about it.

20 Oh, and I want to answer something
21 else that was raised in an earlier
22 communication which goes back to the radium

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1 use way back prior to 19 -- well prior to mid-
2 '62, they started using cobalt somewhere
3 around May 1962. So from 1962 going
4 backwards, the criticism was, this is taken
5 from my report back in September, I believe,
6 or October I think, and at that time I
7 described the analysis of the radiography room
8 using the radium-226 source, as was described
9 to me by the one worker who actually did that
10 and is still around. And very easily I found
11 him to have a good memory. I talked to him
12 several times, and he was very consistent in
13 what he told me. And he said that building
14 was there. And as a matter of fact they found
15 -- John Ramspott found evidence there as early
16 as 1957. My assumption was that it had been
17 there all along. That it probably was there
18 earlier.

19 And this drawing which was made,
20 as it turns out by, I looked at the name on
21 the bottom, I didn't bother reproducing the
22 entire drawing because that wasn't my purpose,

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1 the drawing was made by a physicist from the
2 Nuclear Consulting Corporation. He worked for
3 -- Dr. Konneker was the President and this
4 other man worked under him. And so he went
5 there and made the survey and as a good
6 surveyor does, he made a drawing of that room
7 based probably on drawings he got from the
8 plant.

9 And at that time, and this was
10 confirmed by the radiographer that I talked
11 to, they improved their safety and they put in
12 these steel plates. Apparently they found,
13 either based just on the calculation or maybe
14 based on actual measurement, that they were
15 needed to protect the radiographers who will
16 be spending their time in this room and also
17 people outside this door, which was just a
18 thin, presumably unshielded thin steel door.
19 The purpose there for in order to prevent
20 access.

21 In my model, there are no steel
22 plates. They would have shown up. The model

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1 is simply -- I simply used this drawing.
2 There were a number of drawings in various
3 parts of this FOIA -- this SEC -- AEC
4 literature, AEC correspondence and this seemed
5 to be the best one. In other words, it had
6 the correct scale. Others didn't have the
7 correct scale. They were distorted. So I
8 used this one. I said this seemed to be the
9 most reliable one. And I simply reproduced
10 the concrete part, not the steel.

11 Now in terms of there was no
12 information, nothing to indicate that concrete
13 was added. The indication was that they added
14 the steel plate which was a quick-fix
15 solution. In the model of the exposure model
16 to the radium-226, we had the worker, most of
17 his exposure would simply be, it doesn't
18 matter where he was, he would be carrying the
19 source at the end of this fish pole that could
20 be as near as four feet to his body. So I --
21 he gave me a range of four feet to six feet.
22 I just said let's call it four feet, make it

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1 most claimant-favorable. Let's make it 15
2 seconds. He said 12 to 15 seconds, let's make
3 it 15 seconds. Fifteen seconds to put the
4 source in, 15 seconds to remove it, ten times
5 a day. And when the exposure was going on, he
6 spent his time in this office, which again had
7 this concrete block shielding. Even as far as
8 the material of the concrete it said sand-
9 filled. He said well I don't know what
10 fraction is sand, what fraction is concrete so
11 I am assuming it is all sand. Because that is
12 again the lower density, the most radiation-
13 permeable and, therefore, the most claimant-
14 favorable.

15 MEMBER BEACH: Bob, do you know
16 when the steel plates went in, what year?

17 DR. ANIGSTEIN: Oh yes, exactly.
18 We know they went in like June or July 1962.

19 MEMBER BEACH: '62.

20 DR. ANIGSTEIN: After they
21 discontinued the radium and starting using --
22 so in the radium era, the steel plates were

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1 not there. And the external location was
2 again not outside these relatively thick
3 walls. It will be if you have line of sight,
4 use a thin steel door, a sixteenth of an inch
5 steel, which is essentially transparent to
6 radium radiation. And I put somebody right
7 here. I have got them leaning against the
8 door. I forget how far but nearby. Let's
9 just say for no good reason somebody decided
10 to spend his time outside that door. And he
11 will be getting direct radiation from the
12 radium with only the door intervening. So it
13 doesn't matter how thick the walls are. They
14 were not a factor. They would have
15 insignificant amount -- you had low-level
16 radiation scattered from the walls but that is
17 secondary. That is in the fraction of a
18 percent range.

19 So the model was not based -- was
20 based on this drawing but not the detail of
21 this drawing and the statement that I used the
22 steel plates in my model is simply incorrect.

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1 And the fact that I left out the name of the
2 man I thought was irrelevant is off here down
3 on this edge of the drawing because I only
4 wanted to illustrate how this model
5 corresponded to this drawing.

6 CHAIRMAN ZIEMER: That is for
7 clarification then.

8 DR. ANIGSTEIN: Right.

9 CHAIRMAN ZIEMER: That is not a
10 part of this paper but just clarification --

11 DR. ANIGSTEIN: No, no. This was
12 added on when I saw it.

13 CHAIRMAN ZIEMER: -- on the issue
14 that was raised using that shielding.

15 DR. ANIGSTEIN: This part was --

16 CHAIRMAN ZIEMER: Right.

17 DR. ANIGSTEIN: No, this was done,
18 my report was submitted on last Sunday. We
19 only got Dave's report Friday morning. We
20 turned this around over the weekend and then I
21 subsequent to that I added these additional
22 ones to respond to Dr. McKeel's -- comments.

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1 CHAIRMAN ZIEMER: Okay so as I
2 understand it, on the betatron operations, you
3 haven't normalized anything to the control
4 room but rather have used just the basic
5 output.

6 DR. ANIGSTEIN: Yes. We used the
7 output of the betatron. We used the shooting
8 schedule which simply being told again from
9 the one betatron operator who furnished the
10 most input, the single most prolific source of
11 information ten percent were the long shots.
12 It took an hour at a six-foot target distance.
13 Ninety percent of them were the short shots.
14 That is 90 percent of the shots. If you
15 looked at the duration of course the long
16 shots took longer so they comprised a higher
17 percentage of time of the betatron. And if
18 you simply say they always work at peak
19 efficiency, which is probably again, just
20 people in organizations just don't work that
21 way, but assuming that the betatron is
22 utilized 100 percent of the time, it was shut

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1 off just long enough to go in, set up the next
2 shot, run back into the control room, start it
3 up. So it was always on the maximum amount of
4 time. We calculated roughly 41 percent duty
5 cycle, which again I am sure in the real-world
6 I mean there is no downtime for maintenance.
7 There is no goofing off, shall we say. There
8 is nothing else. You know, running around the
9 clock 168 hours a week, 41 percent of that
10 time. Again these were all maximizing
11 assumptions.

12 And with that, let me go back to
13 what I skipped over. Here is how it ends up.

14 So now we are much closer for the layout man,
15 which is all that matters because he is the
16 limiting individual. So now the DCAS is about
17 half, slightly less than half of our exposure
18 rate. So we are not that far apart.

19 The neutron dose is different
20 because of the different orientation. On the
21 one hand, they actually have a higher, for one
22 of the scenarios, a much higher, instantaneous

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1 dose because it's -- they assume that one of
2 the scenarios I assume only that it's going
3 horizontally perpendicular to the casting and
4 parallel to the floor. They have assumed also
5 a shot which is 45 degrees so it is aimed like
6 halfway out towards that door, in more towards
7 the door, and also aimed 45 degrees up. So
8 you would get a lot of sky shine. I'm not 100
9 percent sure why that gives -- I mean, I
10 haven't worked it out but it certainly, the
11 instantaneous dose rate is even higher.

12 So I just took what I thought was
13 a reasonably maximum. But then with his, it
14 is only a fraction of the time. Because it is
15 so high, it is only a fraction of the time.
16 So the neutron flux doesn't change that much
17 with the direction. The photon flux does. So
18 by reducing the frequency of this occurrence,
19 I would assume why he would get a lower
20 neutron dose. But since after all for any
21 particular dose reconstruction, you know, it
22 is not like let's say beta dose which is a

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1 separate quantity because it delivers dose to
2 the skin, so if you are looking at skin
3 cancer, you are really looking at the beta
4 dose where the photon dose is a very small
5 contribution. Here for any particular dose -
6 - organ, the neutron dose and the photon dose,
7 they are different conversion factors but they
8 are basically added, they are additive.

9 So the photon dose is still by far
10 predominant over the neutron dose and the fact
11 that we were off by a factor of three on the
12 neutron dose, I think I understand why, and I
13 don't think it really makes any difference.
14 Even in our calculation we had 4.483 so it is
15 like what -- this comes out to about five
16 percent. Because of this particular
17 orientation, it comes out to five percent of
18 the --

19 CHAIRMAN ZIEMER: Okay. So in a
20 sense you have bounded the NIOSH thing by
21 using a single shot.

22 DR. ANIGSTEIN: Yes.

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1 CHAIRMAN ZIEMER: And, Dave, on
2 yours now, did you -- help me remember. Did
3 you still use all 15 scenarios or just --

4 MR. ALLEN: Yes. I mean, with
5 Solver it ends up picking essentially two or
6 so.

7 CHAIRMAN ZIEMER: It only picked
8 two or three though.

9 DR. NETON: The two highest.

10 CHAIRMAN ZIEMER: Right.

11 MR. ALLEN: I think it picked a
12 high and a low to get the total number of
13 hours. And then it was asked to maximize the
14 Number 10 Building dose.

15 CHAIRMAN ZIEMER: So you have this
16 configuration part of the time but not 100
17 percent of the time. And then you would
18 normalize I think to the --

19 MR. ALLEN: Well as Bob said, it
20 is not the exact configuration. It is a
21 railroad track that I have part of the time
22 but it is, as you said, it's 45 degrees over

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1 and 45 degrees up, and Bob's straight on and
2 level.

3 CHAIRMAN ZIEMER: Right. So those
4 assumptions are a little different. And then
5 you normalize to the control room value based
6 on the film badge value.

7 MR. ALLEN: In the White Paper and
8 in the addendum normalized to that other film
9 badge rack.

10 CHAIRMAN ZIEMER: To the location,
11 right. So the numbers are different based on
12 how you are approaching bounding.

13 DR. MAURO: And I would say if you
14 had a third person come in to look at this,
15 they may come up with something else. These
16 are judgment calls.

17 CHAIRMAN ZIEMER: Yes, I
18 understand.

19 DR. MAURO: And so I mean, I keep
20 coming back and in my mind the single most
21 important question we have in front of us is
22 we have two separate scientists looking at a

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1 scenario, a circumstance, doing their best to
2 place a plausible upper bound, which there is
3 judgment based on factual information that
4 has been collected over the last few years.

5 Then we have claimants and
6 petitioners. And the real question I see is
7 there anything by way of factual information
8 that characterizes what transpired
9 historically that leads us to a place where
10 perhaps we have not captured that bound? That
11 is, is there a scenario that was raised by Dr.
12 McKeel where wait a minute, wait a minute,
13 there was something else going on or you had
14 the drawing wrong or you had the timing wrong?

15 In other words, when I look at
16 this I keep asking myself the question have we
17 exhausted our understanding as best we could,
18 all of the different positions, thicknesses,
19 operating scenarios in a way that we all agree
20 that we have placed a plausible upper bound?
21 And when I read Dr. McKeel's material, I read
22 the transcript, I keep looking for information

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1 that says is there anything here that is new
2 that says it wasn't the way we thought it was.

3 And I have to say I am having trouble finding
4 it, something that defeats Bob's in a way that
5 would have a substantive effect on the
6 outcome.

7 CHAIRMAN ZIEMER: Right.

8 DR. MAURO: And I think that is
9 where we really are.

10 CHAIRMAN ZIEMER: Okay what I want
11 to do, we are going to take a break for 15
12 minutes and then I want to come back and I
13 want to step through a number of the points
14 that Dr. McKeel raised and ask you guys to
15 respond to them. I want to be very specific
16 on items that he has raised. And I have
17 written down my questions on each of them and
18 see how we can respond. So that will help
19 clarify some of that.

20 So let's take a 15-minute break
21 and then come back. So it is now ten after,
22 so we come back at 25 after.

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1 MEMBER MUNN: Good. And when we
2 get back, I would like to make two general
3 comments that don't bear specifically on the
4 science involved but more on just the general
5 observations about what we seem to be involved
6 with here.

7 MR. KATZ: Okay. Okay, I am
8 putting the phone on mute for you all on the
9 phone, but the line is not cut. You can keep
10 your phones on the line if you want.

11 (Whereupon, the foregoing matter
12 went off the record at 10:07 a.m.
13 and went back on the record at
14 10:26 a.m.)

15 MR. KATZ: Okay, we are back
16 online. Dan, are you with us?

17 DR. McKEEL: Yes, I am.

18 MR. KATZ: Okay, great.

19 CHAIRMAN ZIEMER: Okay, I want to
20 take a few minutes and go through the document
21 that Dr. McKeel generated called General
22 Comments on GSI Dose Reconstruction. I think

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1 this was the original critique to the White
2 Paper. I just wanted to make sure that we had
3 covered the points that were raised there and
4 then we will look at the other ones that were
5 distributed this week.

6 So this is called Critique of the
7 NIOSH January 2/12 White Paper Dose Estimates
8 for Betatron Operations. And each of the
9 items on here is numbered. Item number one,
10 general comments and then there are some sub
11 things on there. And I have some questions on
12 these, and others may wish to add to it. But
13 my first question is, and I will maybe ask
14 Dave Allen to clarify for the record, and that
15 is the statement there is zero urine bioassay
16 monitoring data for GSI workers in the covered
17 period. And do you want to comment on that?
18 We don't have that page.

19 MR. ALLEN: I was going to say,
20 yes, true.

21 CHAIRMAN ZIEMER: Right. But I
22 think the question that is being raised is why

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1 is bioassay not a concern at this facility?
2 Can you address that?

3 MR. ALLEN: I don't think there
4 has been a lot of disagreement that the
5 potential for internal dose is pretty small at
6 this facility. They handled the uranium but
7 they didn't mechanically abrade it or forming
8 or machining or fixing of it of any kind. So
9 there is some loose contamination from uranium
10 that could transfer or get into the air.

11 And we kind of put that in the
12 Appendix with the bounding method based on
13 facilities that handle a lot of uranium.

14 CHAIRMAN ZIEMER: Appendix BB --
15 or not Appendix BB.

16 MR. ALLEN: Yes, Appendix BB. We
17 covered it based on surrogate data from other
18 uranium facilities, based on TBD-6000.

19 CHAIRMAN ZIEMER: And I don't know
20 if SC&A, I think agrees with that. Right?

21 DR. MAURO: To what degree did you
22 look at internal dose from either the uranium

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1 that is airborne from the ingot that may be
2 brought around and/or from the scavenging of
3 the activated material and steel that might
4 have been activated? I know you have modeled
5 both those.

6 DR. ANIGSTEIN: Okay, the uranium
7 was taken from TBD-6000, which you reviewed.
8 So we didn't have any -- we accepted that as
9 being a reasonable model.

10 And the activated steel I did
11 model the internal dose. Maximum internal
12 dose given maximum permissible dust
13 concentrations in the air, ingestion, and
14 under the worst conditions to a worker that is
15 doing, spending his whole time at the grinders
16 and chippers, who is one of those people
17 preparing the castings shortly after they were
18 irradiated with the betatron. And we end up
19 with an annual dose a fraction of a millirem.

20 So it is just not -- very short-lived
21 nuclides in that.

22 There was an interesting tradeoff

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1 here. If the nuclides are very short-lived,
2 they build up quickly. You don't need very
3 much betatron exposure to come to equilibrium.

4 But by the same token, they have negligible
5 biological effect because you take them in and
6 they decay. And if they are long-lived, they
7 don't build up if they have a half-life on the
8 order of a year, it will take years of
9 irradiation of the same piece of steel for
10 them to build up to equilibrium.

11 CHAIRMAN ZIEMER: Okay, I just
12 wanted to have that in the record.

13 The other one under Part 1, I'm
14 just going to comment. It is Section E and,
15 Dr. McKeel, I just wanted to mention to you
16 that these are concerns about attribution.
17 And the Work Group is not going to get into
18 that. I think that is between the petitioner
19 and NIOSH in terms of attribution of
20 information. So my comment is that the Work
21 Group is not going to deal with that.

22 Under E3 on page 2, there is a

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1 comment at about the middle of the paragraph
2 that says to our knowledge NIOSH and DCAS have
3 made no effort to secure possible copies of
4 surveys. He's talking about Allis-Chalmers's
5 survey. And I think this is the issue that
6 Dr. McKeel mentioned earlier, ' identifying
7 information redacted' ' identifying
8 information redacted''s comment that they
9 always surveyed the facilities after they
10 installed. And just for my benefit, has
11 anyone actually tried to get Allis-Chalmers's
12 records? SC&A?

13 DR. ANIGSTEIN: No. About these
14 surveys, Allis-Chalmers presumably installed
15 the old betatron. The old betatron, the
16 building was constructed by or under contract
17 to the US Army Corps of Engineers. Allis-
18 Chalmers installed the betatron and it would
19 have been their normal practice they would
20 have conducted a radiation survey.

21 But as we know, both the Allis-
22 Chalmers records and of course the GSI records

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1 have long, long, long disappeared.

2 CHAIRMAN ZIEMER: Well that is
3 what I was asking. Has anybody gone to Allis-
4 Chalmers for those records?

5 DR. ANIGSTEIN: Have we? No.
6 Well Allis-Chalmers does not exist. And the
7 only descendent, Allis-Chalmers went out of
8 business, went out of the betatron business.
9 They formed or sold their service business to
10 another company I don't remember the name now,
11 so for a number of years they were no longer
12 in the business of installing or building new
13 betatrons. However, they would service them
14 and they would, I think, continue buying tubes
15 from Machlett was one of the tube
16 manufacturers and they would replace the tubes
17 as they burned out.

18 However, that business dissolved,
19 and it was passed on to ' identifying
20 information redacted' ' identifying
21 information redacted'. I think he had a
22 partner at one time. And ' identifying

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1 information redacted' ' identifying
2 information redacted' said he only kept the
3 records that would be useful, you know, he
4 probably was working out of his home. He
5 wasn't going to take up a lot of space so he
6 destroyed -- everything was destroyed except
7 the records that he thought might be useful
8 for him to continue servicing existing
9 customers with the installation.

10 Now that was the second
11 installation when they were more concerned
12 with the new betatron was not even done by
13 Allis-Chalmers. The GSI when they shut down
14 the Eddystone facility which had the betatron,
15 they simply moved the betatron from Eddystone,
16 Pennsylvania, outside of Philadelphia, to
17 Granite City. They themselves, or their
18 contractors, built the building and installed
19 the betatron. And ' identifying information
20 redacted' ' identifying information redacted'
21 told me that he never, ever visited the new
22 betatron. So there was presumably they did

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1 not do a radiation survey. And since the
2 betatron, they might have because by this time
3 the state of Illinois got into the radiation
4 control business. By 1963 the Department of
5 Public Health within the State of Illinois was
6 involved with radiation. The Atomic Energy
7 Commission -- well, I'm not sure about the
8 Atomic Energy Commission because I think that
9 once there is a license, perhaps, Paul, you
10 are much better on the knowledge of that, do
11 they look at all radiation sources, including
12 electronic machine, electrical machines or do
13 they still look only at radioactive material?

14 In other words, would they have been
15 concerned about -- would the AEC have been
16 concerned with the betatron exposure?

17 CHAIRMAN ZIEMER: No.

18 DR. ANIGSTEIN: Even though they
19 had a license for cobalt sources?

20 CHAIRMAN ZIEMER: Well that all
21 depends. Under an AEC license, if a worker is
22 exposed to both, they do exercise control over

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1 non-licensed material. For example --

2 DR. ANIGSTEIN: Including
3 electrical equipment.

4 CHAIRMAN ZIEMER: Yes, they would
5 have included that. If they determined that
6 there was not a clear delineation. In other
7 words, the worker's dose limits would not be
8 just limited to the AEC material.

9 DR. ANIGSTEIN: Oh, sure. Yes,
10 but if all the workers handling the AEC
11 material, meaning the small cobalt-60 sources
12 were monitored with film badges and the ones
13 doing the betatrons were also monitored, so if
14 some of the betatron operators were also
15 isotope workers or in some cases they tended
16 to be assisting the isotope workers, they
17 themselves were not the licensee, then the
18 whole population of workers that could
19 possibly be exposed to radiation would have
20 been monitored. And that is all that would
21 matter. Right? They had the weekly film
22 badge data.

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1 DR. MAURO: I could speak --

2 CHAIRMAN ZIEMER: I'm not sure
3 about that.

4 DR. MAURO: Yes, I can speak about
5 what is going on in the last ten years because
6 I am doing a lot of work right now with the
7 NRC on this very subject.

8 The TLDs, records that are being
9 maintained, the NRC when it collects that data
10 keeps a database, even though it would say
11 hospital, has an NRC license and is registered
12 as a state licensee also because workers are
13 always being exposed. Very often some workers
14 are exposed to both licensed NRC or agreement
15 state sources and also electronic devices.

16 I just want to tease out from the
17 TLD readouts what fraction of the dose is
18 missing. That's a done deal.

19 CHAIRMAN ZIEMER: No, I think the
20 issue would be do they regulate --

21 DR. MAURO: No.

22 CHAIRMAN ZIEMER: -- on the other

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1 stuff. The answer is no.

2 DR. MAURO: I'll tell you right
3 now, I am very close to the State of New
4 Jersey. I work with the Commission on
5 Radiation Programs in the state. Very
6 aggressive program on electronic devices, x-
7 ray machines, accelerators, and they have a
8 very comprehensive set of regulations
9 requiring annual surveys of accelerators that
10 are used for therapeutic purposes.

11 CHAIRMAN ZIEMER: Yes.

12 DR. MAURO: NRC has no role
13 whatsoever there. It is solely controlled by
14 the state.

15 Now the question is well placed in
16 that at that time to what degree --

17 MR. KATZ: Hold on a second.
18 Someone has kicked the phone and there is no
19 connection.

20 (Off the record comments.)

21 MR. KATZ: Folks on the phone, we
22 just -- hello? We have someone's fax machine

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1 on there. Hello? Dan McKeel, are you still
2 on?

3 MR. RAMSPOTT: Hey, Ted. I just
4 redialed in. Everybody went dead.

5 MR. KATZ: Okay. Yes, the phone
6 got disconnected here about a minute ago. So
7 we stopped.

8 MR. RAMSPOTT: We were just
9 starting to hear Dr. Mauro.

10 MR. KATZ: Okay.

11 DR. MAURO: I'll briefly
12 reiterate. At a facility that has both Atomic
13 Energy Act license material under the NRC
14 and/or an agreement state and also has
15 electronic devices that are regulated by the
16 state agencies, the folks that are wearing
17 this -- TLDs, those TLDs are recorded and do
18 not make a distinction between how much is due
19 to what.

20 CHAIRMAN ZIEMER: Sure.

21 DR. MAURO: And the state,
22 agreement state is held accountable for making

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1 sure that those workers meet their five rem
2 per year limit. So there is no way to tease
3 those two out.

4 The second point regarding
5 surveys, the state authority that issues its
6 permit or license to the use of x-ray machines
7 or any other electronic devices has full and
8 sole responsibility over the -- and has a
9 very, at least currently, comprehensive set of
10 state regulations holding the permittee or
11 licensee accountable for meeting all of these
12 requirements, but that is in force by the
13 state, not by the Nuclear Regulatory
14 Commission.

15 To bring it back to this
16 circumstance as I understand, the second
17 betatron came in place at a time when I
18 believe there was some degree of state
19 regulatory oversight. And one would expect,
20 although I can't say for certain, that if
21 there is any way it is today, they would take
22 on that responsibility very seriously.

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1 DR. ANIGSTEIN: And as we were
2 talking, I recall now that in the application
3 to the AEC for the 80-curie source in 1968,
4 they did mention the betatron and they did
5 mention that it was regulated by the state of
6 Illinois and that they fulfilled, that they
7 were good boys and they fulfilled all the
8 state requirements and they passed the test.

9 And as a matter of fact, there was
10 one case on record but that corresponded. The
11 file is not complete, despite the fact that it
12 is over a thousand pages, many of which are
13 redundant and repetitive. But there was one
14 time that there is actually a letter from the
15 state of Illinois saying thank you very much
16 for allowing us, you know, cooperating with
17 us, and they mentioned a name, a state
18 official who met an AEC official and they
19 conducted a survey, they jointly conducted it.

20 So there was state oversight, and
21 there may very well have been irradiations.
22 You know, if they were able to make radiation

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1 survey for the cobalt source, they might very
2 well have done a radiation survey for the
3 betatron.

4 Now the betatron is a little more
5 complicated to conduct a survey because,
6 unlike a radioactive source which has
7 essentially a uniform rate of radiation
8 emission, the betatron acts in bursts. And
9 the instrument would have to be an instrument
10 that would average out over a period of time.

11 That period of time would be maybe a few
12 seconds. But if you had something -- like a
13 Geiger counter would not be a good instrument.

14 It is not a good instrument anyway for a
15 radiation survey but would not be a good
16 instrument for this. But a ionization chamber
17 certainly would be. That is just --

18 CHAIRMAN ZIEMER: Well --

19 DR. ANIGSTEIN: The fact is that
20 we wouldn't even -- did we ask, did we try to
21 find those records? We did not because we
22 wouldn't have even known where to begin to

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1 look. I mean, there is no records -- it is
2 like trying to find a lake in the dessert. It
3 is not there.

4 CHAIRMAN ZIEMER: Well I just
5 wanted to clarify that for my own information.

6 DR. McKEEL: Dr. Ziemer, may I
7 make a comment?

8 CHAIRMAN ZIEMER: Dr. McKeel, a
9 comment on that?

10 DR. McKEEL: Yes. Well the
11 obvious place to start, it seems to me, is
12 with the Illinois Department of Health. And
13 so I did that and sent an open records request
14 to them for all the records that they might
15 have of the GSI -- that would cover the GSI
16 betatron operational period. And what I got
17 back from them is about two pages, one of
18 which had really nothing on it except the
19 mention of the word betatron.

20 So I felt like, yes, there
21 probably were records with the State of
22 Illinois, but I certainly didn't get them with

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1 that open records request, but I did try.

2 DR. ANIGSTEIN: Can I comment on
3 that?

4 CHAIRMAN ZIEMER: Yes.

5 DR. ANIGSTEIN: We made a very
6 extensive effort with the State of Illinois.
7 One of our associates, Joseph Zlotnicki, who
8 lives in Illinois in the Chicago area, and the
9 formerly an official and scientist working
10 with Landauer, so he was very familiar with
11 the State of Illinois. And he made a request.
12 He actually knew individual people there. I
13 independently made a request for anything
14 about General Steel Industries, General Steel
15 Castings, the answer was I have a letter and
16 not with me, simply saying we have searched
17 our records, we have nothing.

18 CHAIRMAN ZIEMER: Okay, thank you.

19 I want to move on then. The item 2A and B on
20 Dr. McKeel's sheet are items we discussed last
21 time, the use of the 80-curie source to
22 establish information about the shielding and

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1 the dimensions of the rooms, we discussed that
2 in some detail. We also talked about the
3 photon-to-neutron ratio issues, and the only
4 question I wanted to ask under that main --
5 under item C, it really is a question of the
6 ingots and dingots, those shots in addition to
7 the uranium slices. The question that is
8 being raised here is does that affect the
9 output of the model. In essence that is the
10 question.

11 If you are shooting at the -- and
12 I think on the ingots or dingots, those are
13 the angular shots, I believe, Dave, were they
14 not?

15 MR. ALLEN: I think they were.
16 The operators described that they had to shoot
17 some shots with the uranium, I think it said
18 obliquely was the term which, you know,
19 angular. And that makes sense with a top crop
20 trying to put --

21 CHAIRMAN ZIEMER: Well my general
22 question is, is that taken into consideration

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1 in the model?

2 DR. ANIGSTEIN: Yes. The actual
3 original characterization of the uranium, we
4 originally characterized the uranium as a
5 dingot. And the dingot actually, the purer,
6 first I thought it was something like some
7 mixture of uranium. The dingot is actually
8 purer uranium than the specifications for the
9 -- obviously the desire is to have pure
10 uranium but -- and there were specifications
11 on the dingot, there was a whole report on
12 dingots which actually John Ramspott had
13 furnished to us back in about 2007. And the
14 chemical, the elemental composition of the
15 uranium we used in the model was that of the
16 dingot. And we believe that this were where
17 the uranium slices were made from.

18 And also I want to comment on the
19 -- angular shots. In the earlier information,
20 I know there have been many repeat interviews,
21 many comments, in my discussion with the
22 workers, you are in Collinsville and knew

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1 about the betatron sites. And I said, is this
2 what you recall, something like up to 18
3 inches in diameter, about four-inch thickness
4 slice? And they agreed, yes, that sounds
5 right. That sounds like what we would always
6 get.

7 Later, in one interview of a
8 worker that I conducted on the telephone, he
9 reported, he worked on the day shift, he
10 reported coming in on a Monday morning and
11 talking to the workers that were just going
12 off the shift, the weekend night shift. And
13 they discussed doing the corner shots. And he
14 even drew me a diagram on a letter that I sent
15 him, or I drew the diagram and he confirmed
16 it, saying that they would shoot just the four
17 corners. They would take mind you a round
18 shape so he could turn it everywhere but they
19 just took four corners.

20 And the only purpose of such a
21 shot would be to establish how would the
22 defective material at either end to crop it.

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1 They did not take shots all around, and it
2 didn't sound like a very frequent thing. He
3 just said, oh yes, that happened. There was
4 one occurrence that was reported.

5 So shooting the slices we know
6 from the Mallinckrodt records was a common
7 practice.

8 CHAIRMAN ZIEMER: Okay.

9 MR. ALLEN: I was going to say in
10 any case essentially the model used was to
11 have a thick enough slice of uranium that
12 absorbed a great deal of the betatron beam and
13 was large enough in area to get the high
14 intensity part of the beam. And that is what
15 we used in our original appendix and then in
16 what we had done more recently was the
17 realization that those top crops the
18 discussion was that if they did 100 percent
19 they had a lot of overlap. So essentially we
20 had to hit at the same spots four times,
21 which can make a bit of a difference. So that
22 is where we are at in the White Paper right

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1 now. And that should account for,
2 conservatively account for virtually anything
3 --

4 DR. ANIGSTEIN: Also, there were
5 two different analyses for two different
6 purposes. One of them was to get the
7 scattered radiation -- maximum --

8 CHAIRMAN ZIEMER: Right.

9 DR. ANIGSTEIN: The other analysis
10 -- and that was also to get what we called the
11 prompt gammas. I shouldn't have said
12 scattered radiation. Cancel that. The prompt
13 gammas and prompt neutrons.

14 What happens just after you shut
15 off the betatron beam, five seconds later
16 which, of course, is a very optimistic time,
17 five seconds later somebody comes into the
18 room to set up the next shot. And what
19 radiation are they being exposed to?

20 So these were the delayed
21 neutrons, the delayed gammas, and so the
22 bigger the slice is, the more there is because

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1 of MCNP reports the total amount.

2 Then there was a second
3 consideration of skin dose. What are the
4 short-lived beta emitters? And there we took
5 a very thin slice. We took a small circle,
6 very thin, so as to maximize the
7 concentration. And this would be the most you
8 would get per gram of uranium. And so we did
9 that analysis.

10 That is not to be a robust
11 analysis because we looked at it again in 2012
12 using -- and turned out to be actually
13 slightly less than what we had gotten in 2008.

14 So we figure we will stick with the 2008
15 results. Number one is they are not that
16 different. Second of all, it turned out that
17 the short-lived isotopes make a very small
18 contribution to the skin dose. In other
19 words, the unirradiated uranium accounts for
20 by far the bulk of the skin dose.

21 CHAIRMAN ZIEMER: Okay, thank you.

22 DR. McKEEL: Dr. Ziemer, may I

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1 make a comment?

2 CHAIRMAN ZIEMER: You bet.

3 DR. McKEEL: I guess my comment
4 is, although I appreciate Dr. Anigstein's
5 comment about this, you know, to me what is
6 the SEC issue and the Appendix BB issue, and I
7 don't want to revisit our conversation of last
8 meeting, but you know he is telling about how
9 SC&A modeled all of this when really for the
10 SEC issue, the issue is can NIOSH do the
11 modeling, and all these various modelings that
12 were done were done by SC&A. So it seems to
13 me we are getting -- I mean, that is
14 interesting. And I understand from Ted and
15 everybody that the job of SC&A is to do
16 evaluations, but you know, they are actually
17 doing -- my question was directed at the SEC
18 issue. And the SEC issue is did David Allen
19 and DCAS do all of that modeling, which I
20 assume if SC&A did it, then they must have
21 thought it was necessary and useful to do
22 that. My question is did NIOSH do it?

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1 And so I would be very much
2 interested in all of these things to hear what
3 NIOSH did. I think that is what the Work
4 Group has got to decide on. Can NIOSH do this
5 calculation, and can they bound the dose with
6 sufficient accuracy for SEC purposes?

7 And honestly, whether SC&A can do
8 it is interesting, but it is not directly
9 relevant.

10 CHAIRMAN ZIEMER: Well I guess the
11 point here is that one of the things SC&A
12 would do would be to determine whether or not
13 NIOSH had omitted something significant in
14 their bounding. And I think in answering that
15 question they have checked this particular
16 parameter and have decided that was not a
17 significant issue and, therefore, did not need
18 to be specifically included.

19 Wanda has a comment.

20 MEMBER MUNN: Is this not material
21 we are going to cover as we go through the
22 matrix?

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1 CHAIRMAN ZIEMER: We may. I'm
2 just trying to --

3 MEMBER MUNN: It is my --

4 CHAIRMAN ZIEMER: I'm trying to
5 deal with the petitioner's questions. I think
6 that was one of the questions.

7 MEMBER MUNN: Right. Right but I
8 think it is dealt with in the matrix response.

9 DR. ANIGSTEIN: Okay, my comment
10 just occurred to me. I think there is a
11 confusion here. Under the -- my
12 understanding, and please, Dave or Jim or Ted,
13 correct me, under the statute NIOSH does dose
14 reconstructions. That is the ultimate. That
15 is the ultimate thing that they do. NIOSH or
16 its contractors, ORAU and its associated ORAU
17 team do the dose reconstructions.

18 What we are dealing with here is
19 what directions are going to be given to the
20 dose reconstructor. If you get a case from
21 GSI or you redo a case from GSI, these are the
22 assumptions you are directed to use. These

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1 are the doses we are directed to assign and so
2 forth.

3 Whether these assumptions are
4 developed independently, say by Dave Allen, or
5 whether they are developed jointly where SC&A
6 has input and NIOSH looks at the input and
7 says yes, we agree with this. We don't
8 disagree with that. We adopt this part of it.

9 And there was some consensus reached. The
10 main thing is that there be a set of
11 instructions, at the bottom line there be a
12 set of instructions that NIOSH has determined
13 and SC&A agrees with as the contractor to the
14 Board and basically that the Board agrees
15 with, the Work Group agrees with. And after
16 that, the dose, the individual 300 odd and one
17 time I heard health physicists doing the
18 individual dose reconstructions are the ones
19 who are given that job.

20 And can they do that? Yes, if
21 given the right instruction of course they can
22 do that. They do it day in and day out.

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1 So whether -- who did the original
2 model and who did -- that is not the issue.
3 The issue is can, in the end, NIOSH do the
4 dose reconstructions. And it seemed pretty
5 obvious that once given the right dose
6 assignments for the right periods, the answer
7 is that they can.

8 CHAIRMAN ZIEMER: Okay, I don't
9 want to spend a lot of time on debating that
10 philosophical issue.

11 A couple other items under this
12 main thing. The petitioners, another concern
13 toward the end of that page, NIOSH has failed
14 to calculate exposures to many unbadged
15 workers who handled uranium during transport
16 loading and unloading and so on.

17 My understanding is that NIOSH's
18 intent here would be to assign these doses
19 that arise out of the model to all the
20 unbadged workers. Is that not correct?

21 MR. ALLEN: Yes, the betatron, the
22 White Paper, the last paragraph or two

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1 mentioned two estimates in the White Paper
2 where the radiographers, the betatron
3 operators, and the layout man the
4 reconstructor be instructed to assign the most
5 favorable.

6 CHAIRMAN ZIEMER: No, as I
7 understand it, you could, in principle take
8 individual jobs such as loading and unloading
9 and try to fraction out what people did. But
10 the worst case, bounding case if they spent
11 all their time, basically, doing the layout
12 stuff that maximizes the assigned dose. Is
13 that not --

14 MR. ALLEN: Yes, that was the
15 intent was that there was probably multiple,
16 more than one maximizing or more than one
17 working scenario that we reported in the White
18 Paper came down to those two.

19 CHAIRMAN ZIEMER: That's right.

20 MR. ALLEN: And the reason it says
21 the most favorable is even though the photons,
22 you know, in the White Paper the photon dose

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1 for the layout man is the one that we would be
2 maximizing for everybody but that is not true.

3 The beta dose.

4 CHAIRMAN ZIEMER: Right.

5 MR. ALLEN: So probably for a skin
6 cancer, the most favorable would end up being
7 the radiographer dose, and the dose
8 reconstructor is instructed to try both.

9 CHAIRMAN ZIEMER: But what you are
10 saying is that these other jobs, such as
11 transporting and loading, would not --

12 MR. ALLEN: Be encompassed in --

13 CHAIRMAN ZIEMER: -- have higher
14 doses than you have already bounded by the
15 layout men. I just wanted to make sure that
16 was the understanding.

17 And then could you also speak to
18 the issue of what is the concern -- the
19 concern is raised that you have identified the
20 wrong peak years where the uranium amounts
21 were the greatest. How does that impact on
22 your bottom line?

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1 The statement is that peak uranium
2 volume for the betatron you stated was in '64
3 to '66 where the purchase orders indicate that
4 it was '62 and declined or '64 and '66. My
5 question is what is the role of that
6 information in terms of the model?

7 MR. ALLEN: Well there is a little
8 bit of misconception there or reading it
9 wrong. And it was the peak operations of the
10 betatron '64 to '66, which was -- or '63 to
11 '66 I think is what we were told --

12 CHAIRMAN ZIEMER: What you are
13 modeling, not the uranium shipments per se.

14 MR. ALLEN: Right. And there is a
15 table in there with the uranium work that was
16 done. And that is true, that wasn't '63 to
17 '66. It was mostly steel work. But the
18 argument in the White Paper used before is '63
19 to '66 was what we were told routinely and
20 this seems to work with some of the ancillary
21 facts was the peak operations of the betatron.
22 We used that in the White Paper to say that

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1 the betatron operations that we model for the
2 new betatron would be bounding on the old
3 betatron, since it was lower intensity and
4 pre-new betatron it would have been a lighter
5 workload from what we are told.

6 CHAIRMAN ZIEMER: Okay.

7 DR. MAURO: Paul, in the interest
8 of keeping the record as complete as we can,
9 when you were talking about the beta dose,
10 this is a question I raised, and I guess I
11 don't recollect the answer.

12 I know that all of us modeled the
13 slice and on the outside of the slice is this
14 crust and the outside crust is where this
15 Puzier thing might or might not occur on some
16 occasions.

17 What I am not sure is when doing
18 the beta dose, to what extent was
19 consideration given that on occasion a full
20 dingot or ingot was in fact brought in for the
21 reasons we discussed earlier. Perhaps not to
22 go through the whole thing but look at the

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1 edges.

2 In a circumstance like that, what
3 you now have is a much larger surface area
4 with crust, which means that the potential for
5 beta exposure from the Puzier effect might
6 increase. And that is an area where I guess I
7 never got a good sense of the degree to which
8 the beta dose that is being reconstructed here
9 has taken that into consideration.

10 CHAIRMAN ZIEMER: I thought we had
11 put the Puzier effect thing to bed --

12 DR. MAURO: We may have, and I
13 apologize if we have.

14 CHAIRMAN ZIEMER: -- and in fact
15 had agreed to modify TBD-6000 to include the
16 discussion of that.

17 DR. MAURO: Okay.

18 CHAIRMAN ZIEMER: That issue has
19 in fact been discussed.

20 DR. ANIGSTEIN: But for GSI, I
21 would not go back and redo it. We did assume
22 with the slice 50 percent of the skin dose

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1 that would either with handling the face of it
2 where you would not have the Puzier effect or
3 you were handling the edge and we are just
4 50/50.

5 So if it was entirely -- yes, it
6 could elevate. I mean, it could be a higher
7 percentage of the time handling the crust. So
8 conceptually it would -- the maximum it could
9 do is double. It would actually less than
10 double it. There would be some increase. And
11 that these were doable. I mean, all we had to
12 do was switch the ratio and increase, you
13 know, this was significant amount of handling
14 the whole ingots. But, again, the information
15 was that mostly it was the slices.

16 MR. RAMSPOTT: Dr. Ziemer, this is
17 John Ramspott, if I could make a comment.

18 CHAIRMAN ZIEMER: Sure, John.

19 MR. RAMSPOTT: Actually, I
20 disagree with Dr. Anigstein's analysis, his
21 last sentence.

22 CHAIRMAN ZIEMER: Okay.

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1 MR. RAMSPOTT: We have absolutely
2 no information, none, zero, no inventory of
3 what went to GSI. We have some hour
4 notations, and they didn't start until '58, so
5 there is five years that is totally missing.
6 And most of the workers that we have all
7 worked with and interviewed started at GSI in
8 about 1963 or '64. And the individuals that
9 actually mentioned slices or dingots or
10 ingots, those people I know started in '64.

11 So talk about what happened at GSI
12 pre-'64 is purely speculation. And I
13 definitely agree with Dr. Mauro. You have
14 five times the mass with an ingot and
15 information I have actually forwarded to the
16 Board, SC&A, and NIOSH from Mallinckrodt. The
17 main intention of what went to GSI was dingots
18 and ingots. And if we all review the DOE,
19 DOL, FUSRAP cleanup reports, they really
20 mention ingots and dingots and the DOE
21 actually revised theirs to show that. That is
22 just fact.

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1 So to try and go to slices, there
2 is another piece to that. It is the handling
3 of anything, whether it is a slice or an ingot
4 or a dingot. You shoot it four times. There
5 is four handlings. There is four chainings.
6 There is four movings. Even a slice of a
7 3300-pound something, if it is cut in one-
8 fifth isn't like picking up a piece of paper.
9 They actually had to chain it and move it.
10 So there is a lot more activity there than I
11 think is being given credit.

12 Thanks for your time.

13 CHAIRMAN ZIEMER: Okay, thank you.

14 Now --

15 DR. ANIGSTEIN: Can I just briefly
16 respond to that?

17 CHAIRMAN ZIEMER: Oh, comment on
18 that? Yes.

19 DR. ANIGSTEIN: The exposure we
20 were just discussing a minute ago, John,
21 before your comment, was we took the number of
22 hours from the purchase orders from

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1 Mallinckrodt, allowed them so many hours of
2 uranium. So part of that time, they were
3 handling the uranium. We assigned the skin
4 doses very, very claimant favorable, as if
5 half the time they actually had their hands on
6 the uranium. Bare hands, mind you. No
7 gloves. Just bare hands. This is about as
8 bad as you can get.

9 The chain men would have been near
10 the uranium. I doubt that they would have
11 spent more time with -- any individual chain
12 man would have spent more time with the
13 uranium than the betatron operators. If there
14 is evidence to the contrary, we certainly
15 would look at that, but it would seem to me
16 that hooking up the chain and putting it on
17 the rail car would involve less personal
18 contact than the betatron operator in the room
19 positioning the film, guiding where it comes
20 in and so forth.

21 But the only difference will be
22 the skin dose. The skin dose needs to be

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1 increased. It can be easily, you know, reason
2 to believe that that can be easily
3 accommodated.

4 DR. MAURO: I think this is
5 important. I mean we just hit on an area with
6 a little softness because of the Puzier effect
7 and the fact that maybe there were these full
8 dingots being handled on occasion. Right now,
9 the models do not explicitly address that.

10 You know, I think it is important
11 it is clear that this, you know, I think the
12 reason we are going through this list, is are
13 there places where there might be some
14 softness in the model that we did not
15 explicitly address, I think it is important
16 that we tabulate them and then decide what
17 needs to be done to deal with those. And I
18 think this is one.

19 I think this is one where
20 something needs to be done to improve the way
21 in which the doses are being calculated or at
22 least evaluate it to see if it's going to

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1 change very much. I understand you made a lot
2 of conservative assumptions in the way you
3 handled the slice. That may very well cover
4 the problem, but what I am hearing is that
5 there is still a little bit of uncertainty
6 here on whether or not it is possible the
7 current method may underestimate the skin
8 dose.

9 CHAIRMAN ZIEMER: Thank you.
10 Other comments on that, Dave?

11 MR. ALLEN: No.

12 CHAIRMAN ZIEMER: But I think what
13 Bob is referring to is that percentage
14 distribution. That is part of it.

15 DR. MAURO: Yes.

16 CHAIRMAN ZIEMER: I think John
17 Ramspott was questioning whether or not we had
18 confidence in actually what forms were being
19 handled prior to -- what is the earliest we
20 have the records on the orders?

21 MR. ALLEN: The purchase orders
22 1958.

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1 DR. ANIGSTEIN: Yes.

2 MR. RAMSPOTT: Dr. Ziemer?

3 CHAIRMAN ZIEMER: Yes.

4 MR. RAMSPOTT: You are partially
5 correct. My concern is the quantity and what
6 the actual material was. It is both.

7 CHAIRMAN ZIEMER: Yes, thank you.

8 DR. McKEEL: And, Dr. Ziemer, my
9 comment, this is Dan McKeel, would be you
10 don't have that information for any time
11 period. You have purchase orders, but it
12 doesn't say explicitly whether they were
13 betatron slices, ingots, or dingots, whether
14 they were pure ingots, whether they were
15 ingots that were alloyed, which we know were
16 produced at Weldon Spring and Mallinckrodt, et
17 cetera. You really do not know the details of
18 the source term at GSI, and you don't know it
19 at all up until the time that we have zero
20 purchase orders.

21 CHAIRMAN ZIEMER: Thank you. I'm
22 making a note of that.

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1 Let me go on here to another item,
2 and that is the question that is raised by the
3 petitioners of using basically the modeling of
4 the new betatron to cover the old betatron
5 activities. Issue 4 on Dr. McKeel's list.

6 So from NIOSH's point of view, how
7 do you look at that?

8 MR. ALLEN: The argument I made
9 was in the White Paper, a paragraph towards
10 the end.

11 CHAIRMAN ZIEMER: Right.

12 MR. ALLEN: And essentially what
13 it came down to was the workers on more than
14 one occasion mentioned that the intensity of
15 the old betatron was less than the new
16 betatron. They mentioned that shots take
17 longer there. They even gave us numbers the
18 best that they could recall at one point. And
19 then we also had information from more than
20 one worker, as I mentioned earlier, that the
21 workload in 1963 jumped up and essentially was
22 responding I believe to the shutdown on the

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1 Eddystone plant. And I think some of the
2 other ones had corresponded to the sinking of
3 the Thresher and they had to do a lot more QA
4 on some of the materials they were making.

5 Between the two, the higher
6 intensity of the new betatron and the more
7 workload in that time frame I thought that the
8 model of the exposures at the new betatron
9 would be bounding on the previous years and
10 that those years also for the old betatron.

11 CHAIRMAN ZIEMER: And I assumed
12 that was the case but just for the record, I
13 wanted to get that out.

14 DR. ANIGSTEIN: I have a comment,
15 too, a further comment further on what David
16 just said.

17 This maximally exposed individual,
18 this layout man who was working in the 10
19 Building right outside the entrance to the new
20 betatron wouldn't have been there. The old
21 betatron was way out in the weeds, about 400
22 yards away and there was no, I was told, you

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1 know, there may have been people going back
2 and forth, but there was no one who was
3 stationed eight hours a day outside the door
4 of the old betatron. So that exposure
5 scenario just didn't exist. And the fact that
6 again it had a lower energy, it had a lower
7 output so the new betatron is limiting.

8 You don't have to consider a
9 weaker source if you have a stronger source
10 and assign that exposure to everyone.

11 CHAIRMAN ZIEMER: Okay, thank you.

12 MR. RAMSPOTT: Dr. Ziemer?

13 DR. McKEEL: May I?

14 CHAIRMAN ZIEMER: John, go ahead.

15 John Ramspott.

16 MR. RAMSPOTT: First off, the old
17 betatron wasn't 400 yards away. It was 300
18 feet.

19 CHAIRMAN ZIEMER: Right.

20 MR. RAMSPOTT: That is a
21 significant difference.

22 DR. ANIGSTEIN: Correct.

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1 MR. RAMSPOTT: And we have worker
2 testimony, people definitely were right
3 outside the betatron door; yard workers and
4 when I say yard I mean railroad yard,
5 laborers, people who had to load and unload
6 those cars, pick up castings. All of the
7 material we showed in a photograph something
8 called a flask or a framework for castings sat
9 out there. So they were definitely right in
10 the area. That is just for the record.

11 CHAIRMAN ZIEMER: Okay, thank you.

12 DR. McKEEL: Dr. Ziemer, this is
13 Dan McKeel.

14 CHAIRMAN ZIEMER: Yes, Dr. McKeel?

15 DR. McKEEL: Really my real point
16 is about the differences between the old
17 betatron facility and the new betatron once
18 again are being skipped over.

19 My concern is that let's just take
20 the buildings themselves. They are not
21 comparable. Their siting is not comparable.
22 The new betatron building was built ten years

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1 after the old betatron building by a different
2 contractor. There is no complete list of
3 engineering drawings or engineering materials
4 that went into those buildings. They weren't
5 the same physical dimensions and the walls,
6 the metal part of the walls didn't go up to
7 the same height. So there were many
8 differences between the building structures
9 themselves, and nobody is able to define those
10 with any degree of clarity. That is number
11 one.

12 Number two, the machines. You
13 know, I think for SEC purposes you certainly
14 can argue that a high dose might be bounding
15 for a lower dose. But the point that I have
16 tried to make since commenting on Appendix BB
17 that has been totally ignored is that under
18 OCAS-IG-003, I believe what you have to do
19 first is you have to calculate, and I am not
20 talking about you, I am talking about NIOSH,
21 needed to calculate the doses from the various
22 sources and show that the doses from, for

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1 example, the old betatron machine were lower
2 than the doses from the new betatron machine.

3 Now that could be modified by a
4 number of factors. For example, let's say --
5 and I agree, ' identifying information
6 redacted' ' identifying information redacted'
7 had detailed records from being at GSI. And
8 although he said he had never been in the new
9 betatron building, we have records that show
10 he was installing doughnut tubes in the GSI
11 machines as late as 1973. And he did have a
12 notebook and he produced those figures for us
13 when we were up in West Allis. And I believe
14 he put those in his report to NIOSH under his
15 contract.

16 So let's say that I think that is
17 true. The old betatron's doughnut tube put
18 out less R per minute than the new betatron
19 building, the new betatron machine, that is
20 true. However, suppose the materials
21 shielding the control room were different.
22 And let's say that it admitted more x- rays,

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1 than did -- x-ray photons and neutrons, than
2 did the material shielding the new betatron
3 control room. You haven't shown that one way
4 or the other.

5 And so that is a level -- Dr.
6 Anigstein made a comment earlier today that
7 the models were not 100 percent. Well I would
8 suggest that in the absence of a formal
9 uncertainty analysis, you can't say whether
10 the models were within five percent, ten
11 percent, 100 percent or 1000 percent of the
12 real situations that existed in those rooms.

13 And so I think when you couple
14 that with the fact that in October 2010 I
15 tried to point out that DCAS came out with a
16 schedule that Dr. Ziemer distributed of what
17 work products they were going to produce under
18 the path forward for GSI. And one of them was
19 a new exposure model for the old betatron
20 facility. And that model was not produced.

21 So I think that becomes an SEC
22 issue, and I think the SEC issue is it just is

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1 not enough to say oh yes, we can do that.
2 They have had 18 months since that time when
3 the schedule was announced to produce a new
4 old betatron model, and they haven't done
5 that. And so that will apply to many of the
6 other issues that I brought about sources at
7 GSI. I think they are all SEC issues. I
8 don't think -- anyway we will go on to that.
9 I am supposed to have a time to make my
10 statements. So while we are on this subject,
11 I just wanted to make that comment. I don't
12 think the buildings or the machines have been
13 proven to be comparable. I definitely don't
14 think it has been shown, except for the output
15 tube of the betatron doughnut tubes, if there
16 was a difference in the output of the
17 machines, and there certainly has not been
18 shown a difference in the exposure or to put
19 it another way, what you are suggesting is
20 that the exposures were the same or lower in
21 the old betatron building and, therefore,
22 bounded by the new betatron exposures. I just

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1 don't think that has been proved.

2 Thank you.

3 CHAIRMAN ZIEMER: Thanks, Dan.

4 MR. RAMSPOTT: Dr. Ziemer, John
5 Ramspott. If I could make one more quick
6 comment on this.

7 CHAIRMAN ZIEMER: You bet.

8 MR. RAMSPOTT: I guess the SEC
9 issue that I see or one of them, there is no
10 badge information for the old betatron. The
11 badges started essentially in 1964, if I
12 understand correctly.

13 Now there might be, and there is
14 one individual who was a part-time worker that
15 had an early badge. We don't know if his
16 badge readings are from isotope work which he
17 did part-time. He was a chem lab guy. He
18 worked ten percent or 13 percent I think to be
19 exact as a radiographer on the weekend. We
20 don't know if he worked Saturday and Sunday,
21 but we have one person. And in those early
22 days, they were actually the highest

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1 employment years at GSI. That has been
2 documented. That is Wikipedia, annual
3 reports, whatever. The early years were the
4 highest employment at GSI. So to say that was
5 more of a slack time, actually it wasn't.
6 They were making more tank turrets and hulls
7 than they ever were the big steam chest.

8 But no badges essentially for
9 those ten years prior to the new betatron?
10 That is a pretty serious issue if the badges
11 are what is being used to do some bounding.
12 Thank you.

13 CHAIRMAN ZIEMER: Thank you, John.

14 DR. MCKEEL: And, Dr. Ziemer, I
15 guess I have to comment something that I left
16 out of that to be complete about why it is
17 important to have an explicit model for the
18 old betatron building that's as good as
19 possible is that the whole reason that GSI is
20 even being considered as an AWE site was
21 because they had an AEC contract to do NDT
22 work on Mallinckrodt AEC uranium.

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1 And the first ten years of that
2 contract was carried out at the old betatron
3 building. There was no new betatron building
4 until 1963.

5 So to not model the old betatron
6 building 1953 to '63 is a serious omission.
7 And in my opinion it is enough, after all the
8 time that has passed by, to recommend that
9 SEC-105 be approved.

10 CHAIRMAN ZIEMER: Okay, thanks.

11 DR. ANIGSTEIN: I have two
12 comments.

13 CHAIRMAN ZIEMER: You want to
14 comment here, Bob?

15 DR. ANIGSTEIN: Yes. First of
16 all, in 2008 report SC&A did explicitly model
17 the old betatron building. We found the doses
18 in the control room to be lower. We modeled a
19 couple of the locations. And the one
20 difference besides the fact that the building,
21 and we say we know nothing about the building,
22 no, we have, first of all the building was

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1 built under the direction of Allis-Chalmers so
2 we have their typical, the Allis-Chalmers
3 betatron manual specifies an example of a
4 building structure. And that building
5 structure in that manual seems to be very
6 close to the building structure in the FUSRAP
7 reports that did investigate the old betatron
8 building. And most likely, that building had
9 not been modified because my understanding is
10 that it has essentially been not ever used
11 after the shutdown of GSI.

12 Secondly, the major source of
13 exposure which is modeled now by NIOSH and by
14 SC&A, the layout man from the new betatron
15 building was, because of this practice that
16 was introduced in I believe 1965 when a new
17 supervisor or manager took over and instructed
18 the workers you flip the head so that we can
19 override the limit switches and radiograph
20 castings right on the railroad track.

21 The previous supervisor who was
22 present at the meeting in Collinsville who is

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1 now deceased agreed with the workers. No, he
2 never would have. They said he wouldn't have
3 allowed that practice. And he agreed. No,
4 that practice was never allowed in those days.
5 And he was in charge then.

6 So the practice that would have
7 been allowed is one I showed here on the
8 diagram on the last meeting was the betatron
9 would normally point away from the control
10 room. It could go as much as a 110 degrees in
11 either direction so it could point towards the
12 walls perpendicular. It could not point at
13 the control room wall directly, and it
14 definitely could not point towards the door
15 leading to the railroad track. That is why
16 Allis-Chalmers that obviously was safety
17 conscious -- they specified ten-foot. I don't
18 know how much more safety conscious you can be
19 than to specify ten-foot thick walls -- didn't
20 bother. I asked my last conversation with '
21 identifying information redacted' '
22 identifying information redacted', did you

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1 specify any metal shielding. He said no, just
2 a light aluminum, they used aluminum, just to
3 keep people out. Because he said we relied on
4 the shape of the limit switches and the L-
5 shaped geometry of the room to make sure that
6 there was no significant amount of radiation
7 escaping out of that building through that
8 door.

9 So by every measure, the new
10 betatron is limiting. You don't need a -- you
11 don't have to analyze it. You have to
12 consider radiation, but you don't have to do a
13 detailed calculation of every single possible.

14 You know to get silly, suppose somebody in
15 those days were wearing a watch with a radium
16 dial. Do you consider that radiation? I
17 mean, it is on-site radiation.

18 DR. McKEEL: No, that is a not a
19 covered source.

20 DR. ANIGSTEIN: It is not a
21 covered source. The betatron, of course it
22 would be -- well, okay. It will be a source

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1 of radiation. The point is -- okay, I am
2 giving a silly example.

3 You only have to consider sources
4 if there is a possibility that they could
5 exceed the limits that you get from other
6 sources. If you can prove that it cannot be
7 greater, then you don't have to do a detailed
8 calculation. It is just a waste of effort.

9 DR. McKEEL: This is Dan McKeel
10 again. I really don't think that OCAS-IG-003
11 has language in there that supports what you
12 just said at all.

13 DR. NETON: This is Jim Neton. I
14 can read you exactly what it says in IG-003,
15 section 3.1. It says, "For exposures that
16 were incurred during the designated DOE
17 contract period, all occupationally-derived
18 source radiation exposures at covered
19 facilities must be included in dose
20 reconstruction." It doesn't have any specific
21 description as to how that exposure analysis
22 is performed.

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1 And I agree with Bob. If you can
2 come up with a limiting case and include that
3 exposure in there and say it is limiting, then
4 that fulfills the criteria of IG-003.

5 DR. McKEEL: Well, I am still
6 saying -- this is Dan McKeel again. With all
7 due respect to both of you gentlemen, you just
8 read me the language of Section 3.1 of OCAS-
9 IG-003 and it did not say. You all are
10 putting words in that document's mouth.

11 DR. NETON: No, I think this
12 document --

13 DR. McKEEL: I mean, that is your
14 interpretation. That may be NIOSH's derived
15 policy now but it is not what that document
16 says.

17 DR. NETON: Well, I was the author
18 of IG-003 and I pretty much know what I said.

19 DR. McKEEL: Well then, it is like
20 laws. Today, people are at the Supreme Court
21 arguing because of a law that is being written
22 that is going to affect all of us in America.

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1 And what they are arguing about is how
2 explicit is the language. And that law is
3 going to be tossed out.

4 DR. NETON: Well, let's go back to
5 the law. The law says that dose
6 reconstructions must be done. And it says if
7 we can reconstruct them with sufficient
8 accuracy -- it becomes an SEC if you can't
9 reconstruct them with sufficient accuracy.

10 And the intent of IG-003 was
11 merely to state that all exposures had to be
12 considered above and beyond any DOE-derived
13 exposures.

14 DR. McKEEL: I agree. I think it
15 is a great document.

16 DR. NETON: It was not speaking to
17 the degree of sufficient accuracy of a dose
18 reconstruction. That is a very separate
19 issue.

20 DR. McKEEL: I understand that.

21 DR. NETON: And what we need to
22 debate is if using another betatron to bound

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1 exposures at the old betatron, is that
2 sufficiently accurate. That is really the
3 question.

4 DR. McKEEL: I say no. And you
5 all obviously say yes.

6 DR. NETON: Well, that's in issue
7 here. But I don't think that it hinges upon
8 an interpretation of IG-003 at all.

9 DR. McKEEL: Okay.

10 CHAIRMAN ZIEMER: Okay, let's move
11 on. Under Issue 5, I mainly have a question
12 and this is for you, Dan. You indicate that
13 there is evidence that the GSI film badge
14 retraction letters signatures by individuals
15 with the highest film badge readings were
16 forged by GSI supervisors. And I am not
17 certain -- is there evidence that that has
18 occurred? I mean, what evidence --

19 DR. McKEEL: Is that exactly what
20 I said, Dr. Ziemer?

21 CHAIRMAN ZIEMER: I'm reading from
22 it. It says: "There is evidence that the

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1 retraction letter signatures were forged."

2 DR. McKEEL: Well, let me tell you
3 -- yes, sir. I understand.

4 Well, let me tell you what the
5 evidence is. The evidence is: first, the
6 background is that although we asked and
7 although we think it is highly necessary, if
8 you remember, you acted as an arbiter to
9 verify and ascertain whose signatures they
10 were on the letter, the retraction letters to
11 Landauer. However, we never actually saw the
12 names. We know all the people involved, but
13 we can't be sure whose names were on those
14 letters. But we are very certain of who one
15 of the two people with the highest film badge
16 data was, and that individual has been
17 interviewed by a worker who is on the phone
18 this morning. And that particular worker said
19 he never was told that he had a high film
20 badge reading.

21 And so the scenario that Dr.
22 Anigstein developed with his colleague, Dr.

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1 Zlotnicki, who was a former Landauer employer
2 and now is an SC&A employee was that the
3 worker apparently agreed with his supervisor
4 and the supervisor wrote a letter on his
5 behalf to Landauer retracting the film badge
6 readings as being -- I'm not sure what word
7 was used, because I really haven't seen a
8 wording of those letters -- but retracted the
9 information. And my point is, if the man
10 asked the worker whose badge had the higher
11 reading didn't even know about that reading,
12 how could he possibly have had a conversation
13 with his supervisor that admitted that it was
14 bogus and not a real value and that it should
15 be retracted?

16 The other reason that I have my
17 serious doubts about the whole matter is that
18 I talked to Landauer a full 13 months before
19 NIOSH got their more complete data set from
20 Landauer on the GSI film badge program 2084.

21 And when I talked to those folks,
22 I talked to two individuals several times,

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1 wrote them, corresponded with them, sent them
2 worker releases and so forth. And they never
3 mentioned any retraction notices being
4 present.

5 So you know, it is not that I
6 doubt Dr. Anigstein at all. I'm sure he saw
7 that. But all I can say is that information
8 when I alone had talked to them, well before
9 SC&A had gotten involved in anything, well
10 before NIOSH had gotten their data, a year
11 before, nobody mentioned anything about the
12 high film badge readings being retracted. And
13 in fact, and I have all this correspondence,
14 one of the ladies at Landauer who was
15 extremely helpful pointed out for me, flagged
16 for me, if you will, the highest film badge
17 reading of all and said, you know, I just
18 wanted to bring this to your attention because
19 it looks like this person received this badge
20 reading in a single quarter.

21 Now it turns out that that highest
22 film badge reading was outside the covered

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1 period. You know, people can argue that,
2 well, maybe that is irrelevant but it wasn't
3 irrelevant because NIOSH and SC&A and the
4 Board, this Work Group made a big deal out of
5 it.

6 And so, I guess that is what I
7 would say. This lady never mentioned that
8 that film badge reading had been retracted.
9 And I can't imagine that she was unaware that
10 that had happened. If these letters that are
11 supposedly transpired, all transpired, I
12 assume, back in the time period when the film
13 badges program was ongoing, that is, prior to
14 1973, then those letters should have been in
15 the Landauer files for what, you know, I
16 contacted them 30 years later. So all of
17 those records should have been in their file.

18 And she would have, I'm sure, mentioned to me
19 that, oh, by the way, those very high readings
20 have been retracted, so you should disregard
21 them. She didn't say that.

22 So you know, I can't, in all of my

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1 dealings with this Work Group, I have tried to
2 report what various workers tell me.
3 Sometimes they corroborate each other,
4 sometimes they don't. I can't really judge.
5 I'm not making judgment on who is telling the
6 truth and who is not because, you know,
7 everybody, I am certain, is trying to do their
8 best at recollecting what happened decades ago
9 and that is very, very hard to do for any of
10 us.

11 CHAIRMAN ZIEMER: Okay, I thought
12 --

13 DR. McKEEL: So that's it.

14 CHAIRMAN ZIEMER: I understand
15 because we have had that discussion before. I
16 thought maybe there was some new direct
17 evidence that you had of forgery that I wasn't
18 aware of.

19 MR. RAMSPOTT: Dr. Ziemer?

20 CHAIRMAN ZIEMER: Yes?

21 DR. McKEEL: Well, actually, the
22 reason I keep bringing it up, Dr. Ziemer, is

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1 because until today, until today that basic
2 information has not been acknowledged. No,
3 you are right. We have had this discussion
4 before. I have to keep on making the point
5 because they don't seem to be recognized and I
6 want them to be recognized.

7 CHAIRMAN ZIEMER: Okay, thank you.
8 Bob has a comment and then we will get to
9 you, John.

10 MR. RAMSPOTT: Okay, sir. Thank
11 you.

12 DR. ANIGSTEIN: Can I comment?

13 CHAIRMAN ZIEMER: Yes, go ahead.

14 DR. ANIGSTEIN: Can I go first?

15 CHAIRMAN ZIEMER: Yes.

16 DR. ANIGSTEIN: All right. Dr.
17 McKeel obtained, because he had to pay for
18 this information and Landauer charges for its
19 time, he obtained year-end summaries. A
20 single report at the end of each year that
21 summarizes the entire dose records for that
22 year of workers who are still employed at that

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1 time. If somebody quits in the middle of the
2 year, it doesn't show up on the year-end
3 summary or in October.

4 The year-end -- so he was given,
5 this lady looks at the year-end summaries and
6 gave him that information. Both NIOSH and
7 myself, we went through every single record
8 for the two and a half years of the covered
9 period and then I went through the quarterly
10 records and many of the individual records for
11 the later years that were not covered and were
12 not part of this, but nevertheless we looked
13 at them.

14 Therefore, she correctly said at
15 the end of the year, and this happened very
16 late in the year, I think in November, it was
17 reported in December, yes, there was this very
18 high exposure.

19 It was not retracted until the
20 following year, but it took time for the
21 correspondence to take place and it took time
22 to get that letter out back to Landauer and it

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1 took time for them to make that correction.
2 If I remember correctly, the correction was
3 made the following February that the dose was
4 subtracted. And there was a notation, DS.
5 And we went to Mr. Zlotnicki, went back to his
6 contact at Landauer. He is on very close
7 terms with the current vice president of
8 Landauer, who is in his own right eminent. He
9 was formerly with Pacific Northwest
10 Laboratory, has publications, a respected
11 health physicist and scientist. And they dug
12 up and went into those files and dug up those
13 letters.

14 The lady that Dr. McKeel talked to
15 would not have had that, would have had no
16 reason to go into that. She did not examine.

17 He did not pay what NIOSH paid. I have no
18 idea what the order number, they gave him a
19 purchase order to dig out every single record
20 for a period starting with January '64, which
21 implicitly covered the previous six weeks
22 because it said here the total starting with

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1 middle of November '63 through the end of the
2 program in '73.

3 They purchased those ten years'
4 worth of records, thousands of records and we
5 went through them. And we found the DS and I
6 said, "What does "DS" mean?" I asked Joe
7 Zlotnicki, "What does DS mean?" He found out
8 it means dose subtracted and he found that
9 correspondence. And the correspondence was
10 released. The names were taken out but the
11 wording of the letters, everything else was
12 released, my understanding, to the
13 petitioners. I was specifically asked to give
14 the redacted version and Ted Katz passed them
15 on. So number one is the fact that the lady
16 that Dan McKeel spoke with did not know that
17 on the basis of the year-end records does not
18 mean it wasn't there. And we have that. We
19 got it from Landauer. So any implication that
20 this is not valid information is simply wrong.

21 And second of all, those incidents
22 happened well after the covered period. It

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1 happened in '69 and there were other sources.

2 The 80-curie source, the cobalt-60 source was
3 in use at that time and there may very well
4 have been potential for exposure or potential
5 for accidental exposure of the film badges.

6 So the fact that one of the film
7 badges had been something like 26 rem, if I
8 recall correctly, even one of the workers who
9 have been recently, currently in touch with
10 the Board, participated in the meeting, said
11 oh yes, he knew. He knew that this -- I
12 interviewed him and it is in the record. He
13 said this man got very upset. He said, "I
14 lost my film badge and I guess you are going
15 to have to fire me because I left my film
16 badge near a radioactive source." There were
17 different details.

18 So it was admitted that no, a
19 human being did not get that dose of 26 rem.
20 And when she said it was in one quarter, to be
21 more specific it was in one week on a single
22 weekly film badge. And the same person who

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1 had that exposure had no significant exposures
2 or no exposures all the rest of his time. It
3 was an accident to the film badge.

4 MEMBER MUNN: In any case, none of
5 it has any bearing on the period that we are
6 concerned with.

7 DR. ANIGSTEIN: It was completely
8 outside.

9 MEMBER MUNN: There is no bearing.

10 DR. McKEEL: No, but what it does
11 -- this is Dan McKeel again. What it does
12 have a bearing on is, I just sent the Board a
13 snippet from one of the two workers who sent
14 me their complete film badge records that they
15 got as part of the NIOSH dose reconstruction
16 program, and I sent all Members of the Board
17 and NIOSH and SC&A, everybody in the room and
18 on the phone a copy of two records that were
19 shown from 4/25/66 and 5/29/66, within the
20 covered period, where a reading that was not
21 on the April report shows up in May, at the
22 end of May as 300 millirems. Now that is not

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1 a gigantic, high reading, but it is one where
2 a new reading appears on the badges.

3 So yes, I am aware of the
4 phenomenon you are talking about. You will
5 also see in my extracted record that I have in
6 that report that there is one reading on that
7 list of 2,470 millirems cumulative dose.

8 So you know, there were other
9 higher doses. The particular gentleman that I
10 am talking about is not the one with the
11 highest 30 rem dose but the other one. And
12 that gentleman, no matter what you all have
13 said, I understand everything that Bob has
14 said. I believe it. I have no problem with
15 it. But I am telling you that one gentlemen
16 whose dose was apparently retracted said he
17 was never told about that high dose.

18 So all it means is that his
19 supervisor -- it is doubtful whether his
20 supervisor ever talked to him about it. Now,
21 if the supervisor just wrote it on his own,
22 retracted the dose without telling the worker,

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1 well, that is another matter.

2 MR. DUTKO: Dr. Ziemer?

3 CHAIRMAN ZIEMER: Yes.

4 MR. DUTKO: John Dutko. Comment,
5 please.

6 CHAIRMAN ZIEMER: Yes.

7 MR. DUTKO: I was the person that
8 interviewed this individual, talked to him by
9 phone. He told me that he was never at all
10 informed of any high exposure. And that after
11 he had left their employment, they continually
12 tried to get him to take a physical exam. He
13 never could understand why.

14 After that conversation with him,
15 sir, he would not answer the phone. He would
16 not answer an email. The only thing I have
17 got to say about the situation, you can take
18 it to the bank that we weren't dealing with
19 any Girl Scout troop.

20 CHAIRMAN ZIEMER: Okay. A couple
21 other items.

22 MR. RAMSPOTT: Dr. Ziemer?

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1 CHAIRMAN ZIEMER: Yes, John.

2 MR. RAMSPOTT: I had a comment, if
3 I may.

4 CHAIRMAN ZIEMER: Yes.

5 MR. RAMSPOTT: It had to deal with
6 this past conversation before Mr. Dutko. And
7 Dr. Anigstein just confirmed for me that I
8 wasn't dreaming this up.

9 There was a conversation between a
10 supervisor who has frequently called in and
11 added information, ' identifying information
12 redacted', which you all know. He was
13 actually interviewed, I thought by yourself,
14 Paul, Dan McKeel, and now I know Bob
15 Anigstein. I wasn't on the interview, but Mr.
16 Dutko and myself had met with this gentleman
17 prior to this interview and if I am not
18 mistaken, and you guys can help me and it
19 sounds like Bob has already started to, he
20 recanted a story about an exposure.

21 It was in 6 Building. The film
22 was misplaced, lost, the badge was lost. He

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1 panicked, he went home, he came back the next
2 day, cleaned out his locker, figured he was
3 fired. And the supervisor just mentioned he
4 went in to his boss, told him what happened,
5 and then I believe some sort of letter was
6 concocted to cover that issue.

7 And you guys talked to . So I
8 think you probably -- hopefully this refreshes
9 some memories on that conversation. So
10 somebody did something. You know, forged is a
11 nasty word, but somebody did something,
12 apparently, and feel free to re-interview that
13 supervisor. I think he would have no problem
14 telling you. He told it to you once. Did I
15 miss that or -- I wasn't there on the
16 interview. You guys did it on your own.

17 Does anybody have a comment on
18 that?

19 CHAIRMAN ZIEMER: Well, I don't
20 know that we need to pursue that here today.
21 I think we got the information we needed.

22 MR. RAMSPOTT: Well, it was just

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1 in answer to your question about --

2 CHAIRMAN ZIEMER: Yes, I was just
3 trying to clarify.

4 MR. RAMSPOTT: -- some things that
5 were jockeyed around.

6 CHAIRMAN ZIEMER: Yes.

7 MR. RAMSPOTT: Hope it helps.

8 CHAIRMAN ZIEMER: A couple other
9 items. Under Issue 6, the issue of whether
10 guards and electricians and so on could have
11 had higher doses than layout workers. I think
12 that we have pretty well established that the
13 layout worker's contacts had to exceed
14 virtually any other job there. I don't know
15 if anyone has any questions on that.

16 But under issue 6, a couple other
17 things I just wanted to comment on. Dr.
18 McKeel, you raised a concern that NIOSH has
19 not done a breakdown of gender in the dose
20 reconstructions. And let me just tell you
21 that typically gender is not an issue in dose
22 reconstructions. NIOSH uses the National

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1 Cancer Institute risk values, which pretty
2 much are gender-neutral with an exception or
3 two. Breast cancer sometimes is an issue, and
4 that is taken into consideration but the
5 assignment of dose as it is in the models
6 certainly is gender-free and there is no
7 either SECs or dose reconstructions that look
8 at gender specifically, except for the case
9 where if a woman gets breast cancer. Then, I
10 am trying to remember, Dr. Neton, is there a
11 different risk value used for the women for
12 breast cancer?

13 DR. NETON: Actually, male and
14 women's breast cancer have the same graph, but
15 it is based on the women's.

16 CHAIRMAN ZIEMER: It is based on
17 the women's, right.

18 MR. ALLEN: The background rate is
19 drastically different.

20 DR. NETON: Yes, actually.

21 CHAIRMAN ZIEMER: Right. And that
22 shows up in the calculation as far as the risk

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1 calculation is concerned.

2 DR. NETON: Correct.

3 CHAIRMAN ZIEMER: So that if a
4 woman gets breast cancer, that actually shows
5 up in the determination.

6 DR. NETON: Correct.

7 CHAIRMAN ZIEMER: So I just wanted
8 to mention that for the record, that there is
9 not a need for a breakdown of gender in terms
10 of the front-end of the dose reconstruction
11 process.

12 DR. McKEEL: The reason I think --
13 Dr. Ziemer, this is Dan McKeel again. I think
14 the reason I put that in there is I wanted to
15 call your attention to a new epidemiologic
16 study that had shown a difference between
17 cancers in women and men. And it was just to
18 point out a general finding.

19 I understand about IREP being
20 gender-neutral and so forth. The other issue
21 that comes up that is a gender issue and I
22 believe it is an SEC issue has to do with the

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1 film badge records from General Steel, which
2 are on a very small subset of people, none of
3 whom are women.

4 So not only is that badge data not
5 representative as far as jobs or years, it is
6 also not representative as far as gender.
7 There are no women represented. So that was a
8 very small point.

9 CHAIRMAN ZIEMER: Yes, I just
10 wanted to clarify that. Okay.

11 MR. CHUROVICH: Dr. Ziemer?

12 CHAIRMAN ZIEMER: Yes.

13 MR. CHUROVICH: My name is Dan
14 Churovich and I would like to have one comment
15 about the safety issues at the Commonwealth.
16 From 1951 to 1961 I worked there and I can
17 tell you the safety issues and state
18 oversight, and any other kind of oversight are
19 almost nonexistent, except for taking care of
20 your eyes wearing your safety glasses.

21 Harry Truman, his comment was that
22 if you -- he made a statement once and said at

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1 the end that a certain statement somebody else
2 had made was horse manure. And you are
3 talking about the safety at the Commonwealth
4 and oversight, that is basically what you are
5 talking about because it did not happen.

6 CHAIRMAN ZIEMER: Okay, thank you.

7 Let's see. Other items on Dr.
8 McKeel's document here we have already
9 discussed. It has been agreed that the double
10 leaf or the lead shields weren't there during
11 this period.

12 DR. McKEEL: Dr. Ziemer?

13 CHAIRMAN ZIEMER: Yes.

14 DR. McKEEL: No. Both SC&A and
15 NIOSH and now you have missed my main point.
16 My main point was I understand that the lead
17 is not being used in the model. That is good.
18 But Dave Allen's model and what he says in his
19 latest report, Addendum 3, is that he still is
20 using a double leaf door in his model. And we
21 have shown you that that double leaf door was
22 not the door that was present in 1966.

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1 Now what I think what is the
2 practical matter of that, you know, does it
3 matter. I think it does, because as everybody
4 has said this morning, you know, what we are
5 talking about is sky shine, radiation going
6 down the tunnel. And possibly -- let's just
7 talk about the new betatron building -- and
8 possibly affecting layout men doing layout
9 work in the tunnel or in Building 10. If that
10 radiation has to pass through two doors, let's
11 call them double leaf and ribbon steel, it
12 does matter what that material is.

13 Now I understand that it may or
14 may not retard photons and/or neutrons but it
15 does, the door, the material of which the door
16 is composed does affect the MCNPX model
17 quantitatively speaking. And it matters which
18 door you have in the model. And I am saying
19 that the door that should be in the model is
20 the ribbon steel door. And I believe Dr.
21 Anigstein mentioned this morning and that he
22 has said before that in his earlier model of

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1 the old betatron building in 2008, you know,
2 he has referred to that door as one-sixteenth
3 inch steel.

4 Now that may be true. You can't
5 tell from the pictures exactly what material
6 the double leaf door was but, you know, it had
7 a discrete thickness. It was made of a
8 discrete type of metal, which we don't know
9 what it was. We call it steel and we call it
10 metal but we don't really know what either one
11 of those doors, what kind of steel it was, or
12 what kind of metal the double leaf door was.
13 So I guess that is my point.

14 You know, if we want the model to
15 be as precise as possible, then we should use
16 the correct type of door material and it was a
17 ribbon steel roll-up door.

18 CHAIRMAN ZIEMER: Okay. We'll so
19 note that. I suspect that is fairly easy for
20 NIOSH to take a look at that and see if that
21 makes any difference. It may make a slight
22 difference.

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1 MR. ALLEN: Yes, we got a steel
2 door there now. And all I did was remove the
3 lead from what I had before. I don't recall
4 the thickness of it. It is less than an inch
5 but it might be a little too thick right now.

6 CHAIRMAN ZIEMER: Okay, we will
7 take a look at that. Okay, thank you.

8 I think the other items on this
9 document we have already discussed. We are
10 going to take a lunch break here in a minute.

11 DR. McKEEL: Dr. Ziemer, may I ask
12 a question --

13 CHAIRMAN ZIEMER: Yes.

14 DR. McKEEL: -- that I am unclear
15 about?

16 You know, I think I appreciate
17 your going through the issues that concern you
18 about what I wrote. But there is an issue on
19 here about petitioner's comments on NIOSH
20 White Paper update, Dan McKeel, number five.
21 Am I going to get to talk about those things?

22 CHAIRMAN ZIEMER: Yes.

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1 DR. McKEEL: Okay, good.

2 CHAIRMAN ZIEMER: Number five on
3 which document, the one I was just looking at?

4 DR. McKEEL: No, I'm talking about
5 the fifth item on the agenda.

6 CHAIRMAN ZIEMER: Oh, yes. Oh,
7 yes, yes, right.

8 DR. McKEEL: Okay.

9 CHAIRMAN ZIEMER: Your comments.

10 DR. McKEEL: Can we do that after
11 lunch?

12 CHAIRMAN ZIEMER: We can do that
13 after lunch.

14 Wanda had some comments she wanted
15 to make earlier and let's do that before we
16 leave. Wanda? Or do you want to wait?

17 MEMBER MUNN: They were only very
18 general comments and really don't have any
19 bearing on our technical discussion here. It
20 was just I think as the discussion goes on, it
21 is more and more clear to anyone who is
22 listening to it that different people infer

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1 different positions on what any fact that is
2 put before them seems to say. And we hear
3 that continually around this table. I'm not
4 sure how we can get past that. It seems to
5 occur everywhere, but it seems to be very bad
6 here.

7 We have people with different
8 backgrounds who infer something from the same
9 set of information that we have, and it is
10 disturbing that we don't have a way to get
11 past that. It is just an observation on the
12 human condition, I suppose. I do wish that we
13 had some mechanism other than what we are
14 doing here to try to get around that. But I
15 throw that out simply because if anyone has
16 any thought on how we might move forward more
17 succinctly on the differences that people have
18 and implications that they see in the same
19 information that we have, it would be
20 extremely helpful to all concerned.

21 I have no words of wisdom in that
22 regard, but I guess we have to slog through

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1 it. That's just -- I only comment.

2 CHAIRMAN ZIEMER: Well, I'm not
3 sure that the goal is to get everybody to
4 agree on things.

5 MEMBER MUNN: No, it isn't.

6 CHAIRMAN ZIEMER: The goal is to
7 get everybody's issues on the table. Insofar
8 as there are facts that we can agree on, that
9 is good. The implications of those facts and
10 anything derived from them, it goes from data
11 to perhaps models to some other level of
12 characterization, we will have to make our
13 individual judgment about that. The
14 petitioners I mean certainly have a different
15 view than -- or may not, than NIOSH. SC&A may
16 or may not agree with NIOSH. There will be
17 points of, perhaps, disagreement.

18 Ultimately, I think it will fall
19 on the Work Group Members to take this
20 information and make a judgment on whether or
21 not we are prepared to recommend an SEC for
22 all or part of the time periods in question.

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1 MEMBER MUNN: I agree. My concern
2 is the fact that we seem to be working toward
3 different goals. And sometimes it is helpful
4 to reinforce the idea that the goal, I believe
5 I am stating this correctly, of the Board and
6 certainly the goal of this Work Group is to
7 identify the best possible science in
8 relationship to ability to do dose
9 reconstruction for this specific site.

10 CHAIRMAN ZIEMER: Right.

11 MEMBER MUNN: And if that is the
12 same goal that we are all working toward, then
13 it is helpful to restate it once in a while.

14 DR. MAURO: To add to that very
15 quickly. What I am doing is there is a lot of
16 material to go through. What I am doing is I
17 am writing down the essence of which items
18 that Dr. McKeel brought up that I believe need
19 to be answered that have not yet been
20 answered. And I have two. And quite frankly
21 I was surprised by the second one, namely the
22 thickness of the ribbon door. It is my

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1 understanding that whichever assumption you
2 use regarding -- once you get rid of the lead,
3 you are not going to change anything. Now I
4 was hoping --

5 CHAIRMAN ZIEMER: Well, we don't
6 know for sure. But it is easily checked.

7 DR. MAURO: Yes, there's a
8 difference -- the difference between --

9 DR. ANIGSTEIN: The lead or the --

10 DR. MAURO: No, no not the lead.
11 Take the lead out.

12 CHAIRMAN ZIEMER: The lead is out
13 anyway.

14 DR. MAURO: Dr. McKeel had
15 mentioned that once the lead is out, we still
16 have a question about whether the ribbon is a
17 double ribbon or a single ribbon, which
18 changes the thickness.

19 DR. ANIGSTEIN: The thickness --
20 again, we had a disagreement. It was an
21 inadvertent aspect of his model where you put
22 in a thick steel. And the thin steel, it is

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1 not going to be anything less than a sixteenth
2 of an inch. This is a typical stiff sheet
3 metal and we use a typical alloy. Steel is
4 basically iron with a little bit of carbon
5 added, some trace elements, some trace amounts
6 of other metals, unless you are looking for
7 stainless steel or some special purpose steel,
8 but ordinary steel. We took a typical alloy
9 and changing the alloy composition, you know,
10 on the level of significance that we are
11 operating, is it going to change it in the
12 fifth decimal place? Probably.

13 DR. MAURO: That is what I wanted
14 to get on the record. We didn't get that on
15 the record.

16 You see, right now I have, as we
17 left it up to this moment, this was item
18 number two. I don't think it deserves to be
19 an item number two for the reasons Bob just
20 said.

21 MEMBER BEACH: Well, and just for
22 me, I am looking for, once all the

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1 recommendations come out, all the questions,
2 then I am looking to NIOSH to see what they
3 are going to do with all that information. So
4 we still don't know that at this point
5 completely.

6 CHAIRMAN ZIEMER: Okay, let's
7 break for lunch. Try to get back by 1:00. We
8 are a little bit after 12:00 but let's get
9 back here by 1:00, and we will hear from Dr.
10 McKeel and then we want to go through the
11 matrix.

12 (Whereupon, the above-entitled matter
13 went off the record at 12:05 p.m. and resumed
14 at 1:05 p.m.)

15
16
17
18
19
20
21

1 A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

2 (1:05 p.m.)

3 MR. KATZ: Okay, we are back.

4 This is the Advisory Board of Radiation Worker
5 Health, TBD-6000 Work Group. Let me just
6 check on the line. Dan and John, are you with
7 us again?

8 DR. McKEEL: Yes, this is Dan
9 McKeel. I'm here.

10 MR. RAMSPOTT: John Ramspott. I'm
11 here.

12 MR. KATZ: Super. And Mr. Dutko,
13 too?

14 MR. DUTKO: Yes, sir.

15 MR. KATZ: Great.

16 CHAIRMAN ZIEMER: Okay, let's
17 begin now with comments from Dr. McKeel. And
18 Dan, we do have the materials that you
19 distributed this past week and if you need to
20 refer to those, that is fine but I will let
21 you proceed as you wish.

22 DR. McKEEL: Okay. Thank you very

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1 much for giving me the opportunity. I am
2 going to try to keep my remarks very focused
3 in the spirit of what Wanda Munn was asking
4 for this morning.

5 My time today is pretty limited
6 and the Work Group has a lot more to get
7 through. So I am going to try to focus on the
8 two Allen/NIOSH Path Forward White Papers, but
9 also I want to raise SEC-105 issues, so
10 everybody can have time to discuss the SEC
11 matrix.

12 And hopefully, at the end of this
13 I hope Dr. Mauro has added to his list of
14 issues that need to be resolved for the SEC.

15 First I have a comment regarding
16 David Allen's addendum number three. We went
17 over this briefly this morning. I agree with
18 SC&A that the new betatron model is still not
19 correct. A) is: the modeled new betatron
20 tunnel door was not double leaf, even though
21 it was minus lead shielding. It was a thinner
22 driven-steel roll-up door, the exact physical

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1 characteristics of which, including the
2 thickness and the type of steel are not known.

3 There was no lead shield.

4 I think not incorporating this
5 into the model already indicates that my
6 presentation on 3/15 was ignored on this
7 point.

8 Point B is that David Allen did
9 not model the badge position number two for
10 GSI. And the new betatron film badge rack
11 when it was moved farther away from the
12 betatron source during 1964-1966.

13 The Landauer GSI film badge
14 program number 2084 data has been analyzed
15 thoroughly and accurately, nor has it been
16 presented in entirety to the TBD-6000 Work
17 Group or the petitioner.

18 McKeel's most recent White Paper
19 to the Board on 3/27/12 showed evidence of an
20 exposure of 300 millirem that newly appeared
21 on a worker record between April 25th and May
22 29th, '66 of the covered period. McKeel

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1 interprets this as a previously unreported
2 overexposure incident that was apparent from a
3 detailed temporal analysis of film badge
4 records that NIOSH has possessed for several
5 years.

6 The replicated records showed 33
7 records on one page. There were 21 instances
8 of cumulative photon dose marked M and 12
9 instances of photon doses ranging between 10
10 and 2,470 millirem, 2,470 millirem with
11 several 20 millirem and a 40 millirem dose.
12 No sheets had any beta or neutron doses
13 recording.

14 Point D under one, McKeel
15 introduced a new real-world new betatron
16 layout worker shooting scenario attested to by
17 former GSI betatron employees and contained in
18 one of his four recent communications to this
19 Work Group following the 3/15 Work Group
20 meeting.

21 What he showed was that layout men
22 worked on castings that required a quick

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1 turnaround, referred to as hot, rushed or
2 urgent nondestructive testing jobs in the rail
3 tunnel just outside of the thin roll-up steel
4 door while shooting was ongoing.

5 Two workers who are known to the
6 Work Group and SC&A offered this new affidavit
7 information. Dr. Anigstein mentioned that he
8 didn't think that scenario would add to the
9 dose because it wouldn't be possible to have
10 gotten another casting into the beta room to
11 be worked on while the layout men were doing
12 their job outside. And I think that is just
13 wrong.

14 I think it would be easy to
15 imagine a scenario where a smaller casting had
16 already been brought into the betatron
17 shooting room and then suddenly men found or
18 discovered a defect and maybe they fixed it
19 and then it had to be turned around quickly
20 and they did that just outside the tunnel
21 area.

22 In any case, the SEC issue

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1 regarding GSI film badges is the pedigree of
2 these data. It is limited to males. It is
3 limited to one job Class, which is betatron
4 employees that itself is heterogeneous and
5 includes clerks and photography technicians.
6 And badge data is available for only three
7 years, 1964 to `66, out of a 13-year covered
8 period. There are no measurements of beta
9 dose or neutrons available on only 89
10 individuals out of a work force of 3,000 to
11 4,000 persons.

12 There is no reasonable scientific
13 basis to construe these very limited badge
14 data as being representative of the entire
15 work force. Nor should they be extrapolated
16 to cover all workers during the entire 13-year
17 covered period of 1953 to 1966, as NIOSH
18 suggests.

19 These were very limited film badge
20 data and they are not even bounding for
21 betatron employees who only wore them part-
22 time. Badges were not worn, for example, by

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1 betatron employees doing layouts in the new
2 betatron tunnel on urgent, hot or rushed
3 casting jobs. Those unbadged layout employees
4 would be expected to have the highest
5 exposures of any employees. And I say this.
6 Of course, that has to be proven by the model.

7 These doses have not yet been
8 modeled by NIOSH or SC&A during the Path
9 Forward time period from October 2010 until
10 today.

11 Main point two. Petitioner
12 challenges the validation of a 25 MeV new
13 betatron source using a post-1968 GSI cobalt-
14 60 source which was 54, not 80, curies, that
15 had a beam geometry that was very different.
16 The Co-60 sources does not model neutrons that
17 were a significant portion of the betatron
18 output. And GSI workforce measured data from
19 1971, which is outside the covered period.

20 Item three, the petitioner objects
21 to NIOSH and SC&A passing off betatron
22 residual radiation that was measured as quote,

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1 "magnetic interference," unquote. This is
2 their unproven construct but it was measured
3 by a paid CDC NIOSH consultant. In fact,
4 because setup workers were exposed to the
5 distance of one to two feet rather than six
6 feet from the betatron nose cone while the
7 machine power was turned off, the inverse
8 square law indicates a dose of 60 millirems
9 rather than five millirems should be assigned.

10 NIOSH has ignored more recent testimony
11 replicated in my post-3/15 White Papers that
12 ' identifying information redacted' '
13 identifying information redacted' was re-
14 interviewed and said that the had measured
15 residual radiation emanating from the doughnut
16 tube of the betatron within seconds after
17 removing it from an Allis-Chalmers betatron
18 that was similar to the one used at GSI.

19 Point number four. SC&A in 2008
20 modeled an 80-curie source at GSI. Dr.
21 Anigstein recently pointed out correctly that
22 the Allen Co-60 model assumed the source was

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1 80-curies, when in actuality it was only 54-
2 curies in 1971. This source was not factored
3 into the 2008 model of the same GSI source
4 term.

5 The Path Forward documents have
6 stated that GSI obtained the 80-curie source
7 after 1966, a point that at least six GSI
8 workers still dispute. They testify the large
9 source was present during the 1964 to `66 time
10 period. Petitioner believes that NIOSH, in
11 the spirit of being claimant-favorable, should
12 model the Co-60 80-curie source to comply with
13 OCAS-IG-003 guidance. This is an SEC issue
14 because the NIOSH Path Forward White Papers
15 have not modeled this very important source.

16 Point number five. No direct
17 measured monitoring data exists for either
18 operating betatron for any portion of the
19 covered 1953-1966 time period. This includes
20 air monitoring or neutron flux, plausible
21 coworker data or surrogate data. There are no
22 valid computer models for this because there

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1 is no real data to validate the model. MCNPX
2 alone is not sufficient.

3 Point number six. No new old-
4 betatron model was introduced by NIOSH and Mr.
5 Allen in either recent White Paper for the
6 Path Forward GSI Initiative. This is despite
7 the fact that SC&A modeled the facility back
8 in two thousand -- well, a while back. The
9 old betatron facility was built ten years
10 earlier than the new betatron building by a
11 different contractor using different
12 materials.

13 The new betatron building was a
14 short distance away from a heavily populated
15 work area in Building 10. The old betatron
16 was located in a field 300 feet away from the
17 new betatron facility with heavy outside
18 traffic around it.

19 The old betatron building had
20 different physical characteristics that are
21 not completely defined. Engineering drawings
22 do not exist for either betatron facility.

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1 Only sketches that are not to scale and are
2 not accompanied by any certified list of
3 construction materials. The Allis-Chalmers
4 manual may apply or it may not apply.

5 E. All of the Mallinckrodt AEC-
6 contracted uranium NDT work between 1953 and
7 1963, including the peak production year of
8 1962 was done in an old betatron facility.
9 The new betatron facility was not built until
10 1963. This is also an SEC issue. Betatron
11 Path Forward progress to date after 18 months,
12 NIOSH has not been able to develop and
13 validate an updated old betatron exposure
14 model using the production code of MCNPX
15 together with the real-world measured data.

16 Point seven, NIOSH has not modeled
17 the two GSI radium-226 sources correctly. The
18 sources were used inside the 6 Building
19 radiography facility pre-1962, as well as in
20 other GSI buildings, as testified to by
21 workers.

22 Petitioners have shown at the 3/15

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1 Work Group meeting that the radiograph room in
2 building 6 facility existed as indicated on a
3 January 29, 1957 GSI plan engineering drawing.

4 This is also an SEC issue.

5 Point number eight. The GSI-owned
6 iridium-192 NDT source was not modeled at all
7 in the Path Forward White Papers. In the 3/15
8 meeting, petitioners reviewed five pieces of
9 evidence that such a source was used to
10 inspect pipe wells in Buildings 9 and 10 and
11 rail transit cart trucks in the Building 6
12 radiography facility.

13 We don't know the way it was used.

14 We don't know the nominal when new size,
15 although one worker testifies it was 20-
16 curies. Nothing is known exactly when it was
17 used. The best estimate from testimony is the
18 late 1950s and possibly into the early 1960s
19 before St. Louis Testing Company entered the
20 picture with their own iridium-192 and cobalt-
21 60 sources.

22 The half-life of radioactive

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1 iridium-192 is 73.83 days. Therefore, knowing
2 the exact curies when the source was brand new
3 and the time passed since use are both
4 critical for accurate modeling of this source.

5 None of these factors are known for the GSI-
6 owned iridium-192 source, or for the St. Louis
7 Testing Ir-192 source for that matter.

8 To my knowledge, the St. Louis
9 Testing Company iridium-192 and cobalt-60 AEC
10 source license was never obtained and
11 examined by either NIOSH or by SC&A.

12 Point number nine, next to the
13 last point. NIOSH has not modeled the two GSI
14 portable 250 kVp x-ray machines correctly. No
15 doses have been assigned to these sources by
16 Dave Allen in his August 2011 Path Forward
17 White Paper on portable GSI sources.

18 NIOSH knows practically nothing of
19 where the units were used, what they were used
20 for, what were the NDT inspection targets, how
21 frequently they were used and by what workers.

22 What were the exposure conditions, dose rate,

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1 time, et cetera? These units were not
2 equipped with safety interlock. OCAS-IG-003
3 mandates doses from these sources must be
4 determined. This is an SEC issue because
5 NIOSH has not demonstrated it can model these
6 two sources with sufficient accuracy.

7 Final point ten. The petitioners
8 challenge the NIOSH dose model for the two
9 small nominally 500 millicurie Co-60 sources
10 used in the 6 Building radiography building at
11 GSI. These data are based on Nuclear
12 Consultants Corporation's measured data from
13 1962, during and before the date which was
14 July and June 1962 that D. Carr indicated was
15 when added steel plate and concrete shielding
16 was added to the Building 6 radiography
17 facility. And the drawing that I showed on
18 3/15 did show that new concrete wall material
19 was added to that facility on those dates.

20 One set of NCC measurements,
21 according to NRC FOIA 2010-0012 documents was
22 obtained in January of 1962 before the

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1 shielding was added and the other set were
2 made during the period the extra shielding was
3 being installed.

4 On 3/15 the petitioner offered an
5 analysis of the geometry of the Building 6
6 overhead crane and catwalk which suggests it
7 might have blocked some of the Co-60 source
8 radiation from below.

9 The accuracy of the NCC Building 6
10 radiography facility measured data was not
11 checked using MCNPX code, which seems to the
12 petitioner to be an obvious thing to do for
13 two reasons. A) the NCC data accuracy could
14 be established on a firmer scientific basis;
15 and B) the NCC-measured data could serve to
16 validate the MCNPX model. This too is an SEC
17 issue. NIOSH cannot assign doses from the
18 small 0.5-curie Co-60 sources because complete
19 information is not known how these sources
20 were used and because workers testify that
21 some of the enumerated safety procedures, the
22 GSI 1962 AEC license application had stated to

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1 be in place were not followed according to
2 worker testimony.

3 So that ends my remarks and I will
4 try to keep my input into the matrix issues
5 minimal because I think I have covered those,
6 hopefully, in these remarks.

7 Thank you very much.

8 CHAIRMAN ZIEMER: Okay, thank you.

9 Let me see if there is questions or comments
10 on any of these items. Okay, Bob?

11 DR. ANIGSTEIN: Okay, going down
12 the list, about the castings being
13 radiographed on the railroad and it was a
14 layout man working near the ribbon door. As I
15 said, you cannot have another casting -- not
16 talking about the side of the casting. Two
17 railcars cannot pass each other when they are
18 on a single track. Therefore, there would
19 have been no point in having a casting on the
20 railcar inside the shooting room and another
21 railcar blocking the exit because the whole
22 point of it was to make this whole thing

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1 quick. And this would have made it take much
2 more longer.

3 DR. McKEEL: Bob? Dr. Anigstein,
4 please let me explain. I understand what you
5 are saying but here is the scenario that I
6 think happened.

7 They brought casting number one on
8 a transfer car into the new betatron building.
9 The crane picked it up and set it on the place
10 where it would be imaged by the betatron.
11 That car was then removed from the building.

12 Then a new transfer car was rolled
13 up to the door on a urgent rush basis and
14 things were imaged that way. And then that
15 casting was laid out. The casting was brought
16 into the betatron room. The other casting in
17 this scenario would have to accommodate the
18 shooting room in addition to the rush
19 castings. But it was a big room and that
20 could easily be done.

21 So I am suggesting that they
22 brought the new casting in, they imaged it,

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1 they took it out on the railroad transfer car
2 and then at a more leisurely pace, they then
3 went ahead and imaged casting number one and
4 took it out on a railroad car. And that would
5 be how you got to do that.

6 DR. ANIGSTEIN: Dr. McKeel, I
7 understand that. And all I am saying is that
8 the casting that is already in the betatron
9 building would not have been on the railroad
10 track. It would have been shot elsewhere in
11 the room, where the exposure in the railcar
12 would have been much less.

13 MR. DUTKO: Dr. Ziemer?

14 DR. McKEEL: Dr. Anigstein, I'm
15 sorry. I really have to interrupt you here
16 because I want to finish my line of talking
17 here, please.

18 I understand what you are saying
19 but once again, you can't presuppose modeling
20 results without actually doing the work. And
21 what I am saying is that specific situation
22 has not been modeled. We do not know the

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1 results of it, and you can't just state a
2 priori I know what the results will be. You
3 have to do the modeling.

4 Okay, that's it.

5 CHAIRMAN ZIEMER: Somebody else
6 had a comment there?

7 MR. DUTKO: Yes, sir.

8 CHAIRMAN ZIEMER: Yes, go ahead.

9 MR. KATZ: Mr. Dutko, go ahead.

10 DR. McKEEL: Terry, go ahead.

11 CHAIRMAN ZIEMER: I wonder is he
12 pushed the mute button or something.

13 DR. McKEEL: He might have a
14 problem with his phone.

15 CHAIRMAN ZIEMER: Well, we will go
16 ahead here and then if he comes back.

17 DR. ANIGSTEIN: I would like to go
18 down the list.

19 CHAIRMAN ZIEMER: Go ahead, Bob.

20 DR. ANIGSTEIN: The second comment
21 was that those doses of 2,470 millirem, 300
22 millirem, this is the first we have heard of

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1 them. In the SC&A report, my report dated
2 November 8, 2008 explicitly listed all of the
3 doses during the covered period that were in
4 excess of M, meaning minimal. There were
5 about 27 such doses. Most of them were just
6 ten millirem and there was 40, a 300, a 2470.

7 This was reported to NIOSH and to the Board.

8 If I remember correctly, at that
9 time, OGC would not allow those numbers to be
10 left in the redacted, PA-cleared copy. So it
11 may very well be that the petitioner, the
12 others never saw those numbers in that report.

13 MR. DUTKO: Dr. Ziemer?

14 DR. McKEEL: Well, wait. Terry, I
15 have got to finish this. Dr. Anigstein is
16 asking me questions --

17 MR. DUTKO: I'm sorry, sir.

18 DR. McKEEL: -- and I need to
19 answer this.

20 MR. DUTKO: I had something
21 important to say.

22 DR. McKEEL: All right.

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1 CHAIRMAN ZIEMER: Hang on. Just
2 hang on. Go ahead, Bob.

3 DR. ANIGSTEIN: All right.

4 DR. McKEEL: Well, I would say he
5 said you have never seen that before but this
6 is a report that a worker obtained by asking
7 for his case file and specifically his NIOSH
8 dose reports.

9 DR. ANIGSTEIN: And those numbers,
10 Dr. McKeel, those numbers are in the data that
11 we have and they are in my report from
12 November 8, 2008. Our job is to report to
13 NIOSH and to the Board, NIOSH makes the -- The
14 rest of the Agency makes a decision of what to
15 release to the petitioners.

16 DR. McKEEL: I just want to remind
17 everybody that in the sample that I saw --

18 DR. ANIGSTEIN: I have that
19 report.

20 DR. McKEEL: Well, I know you do.

21 DR. ANIGSTEIN: I have that report
22 and I have reported it to the Board.

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1 DR. McKEEL: I am trying to show
2 you that in the -- and I showed you the actual
3 report in my report. You know, there is a
4 value on that page of 2,470 millirem --

5 DR. ANIGSTEIN: And that data was
6 reported to the Board back in November 2008.
7 This is not new information.

8 DR. McKEEL: Well, I'm sorry then,
9 if I am going over old information. I'm
10 trying to summarize four years of information
11 that we have given to this Work Group and
12 still we have not gotten a vote on a
13 recommendation for the SEC. So I think it is
14 perfectly okay to do that.

15 You know, I pointed out the
16 temporal relationship. I don't want to go
17 into a long thing about it and I really don't
18 think I am being cross-examined here. That is
19 not what is going on here. What is going on
20 here is that that data, what my comment was,
21 that data was never completely reported to me.
22 I personally think that OGC made an error in

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1 that. You know, I think they can redact names
2 but I don't think they should redact doses.
3 That is absolutely ridiculous.

4 And I do point out that this has
5 been a recurring theme in my interaction with
6 the NIOSH and the Board. The Privacy Act
7 doesn't cover dead people. And a lot of the
8 doses that we were talking about were deceased
9 people.

10 So anyway, I apologize if I
11 belabored old data that everybody knew about.

12 But when I keep on hearing that the vast
13 majority of these numbers were M, then all I
14 can say is from a simple spot check, I wanted
15 to put some perspective on that observation
16 and I believe I did.

17 CHAIRMAN ZIEMER: Dan, we
18 appreciate that. And actually I wasn't aware
19 that these numbers got redacted. If they
20 were, I am not personally sure why they would
21 have redacted numbers.

22 DR. McKEEL: They did.

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1 DR. ANIGSTEIN: They were
2 redacted.

3 DR. McKEEL: I thought it was
4 improper at the time and I still do.

5 MS. LIN: I'm not quite sure, I
6 think I haven't seen a copy of --

7 DR. ANIGSTEIN: It was long before
8 Jenny was on the team.

9 CHAIRMAN ZIEMER: Our current
10 counsel here wasn't aware of that. But we
11 will anyway, just so you are aware, we had
12 seen the numbers.

13 MR. KATZ: I don't know
14 specifically, but it is very possible, you
15 don't just redact names, you redact any
16 information that would be identifying. And in
17 some cases where numbers are unusual and in
18 effect would be identifying in and of
19 themselves, you would have redacted them too.

20 It is anything that is identifying, not just
21 names. So that is possibly what happened. I
22 couldn't tell you.

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1 CHAIRMAN ZIEMER: They might have
2 redacted whole lines, you mean?

3 MR. KATZ: So they would have
4 redacted any information that would lead
5 someone to be able to identify an individual,
6 not just a name is what I am saying.

7 So if you have, for example, only
8 a few data points and so there are only three
9 workers that were ever involved in a certain
10 operation or what have you, you would have
11 redacted all the information you needed to
12 protect the privacy of those individuals.

13 CHAIRMAN ZIEMER: And of course an
14 M is also considered a number here. So I'm
15 not sure --

16 DR. MAURO: No, I know exactly
17 where it was --

18 CHAIRMAN ZIEMER: Well, okay.

19 DR. MAURO: I was there.

20 CHAIRMAN ZIEMER: It apparently
21 happened. Our apologies. I wasn't aware that
22 that had happened.

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1 (Simultaneous speaking.)

2 MR. KATZ: Okay, so that's what --

3 MEMBER BEACH: And then John had a
4 comment.

5 MR. ALLEN: Can I make one comment?

6 CHAIRMAN ZIEMER: Okay. Yes, Dave
7 Allen.

8 MR. ALLEN: From what Dr. McKeel
9 put in here, the numbers he is pointing to, I
10 just wanted to point out that the column of
11 numbers of that he is pointing to is the
12 permanent column.

13 CHAIRMAN ZIEMER: The accumulated
14 dose?

15 MR. ALLEN: Right, this is their
16 essentially lifetime dose for the period of
17 time that Landauer had the dosimetry data.
18 The number to the right of that is the number
19 of the badge reading, the badge number.

20 CHAIRMAN ZIEMER: The badge, what
21 that represents.

22 MR. ALLEN: Like 125 for a number

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1 of them, et cetera.

2 CHAIRMAN ZIEMER: Okay.

3 MR. ALLEN: The numbers all the
4 way to the left, the column of Ms all the way
5 to the left are the weekly badge readings for
6 that particular week.

7 CHAIRMAN ZIEMER: Yes.

8 MR. ALLEN: And the three columns
9 that end with those numbers he is pointing to
10 are calendar quarter, calendar year, and
11 permanent.

12 CHAIRMAN ZIEMER: Right.

13 DR. McKEEL: And what I am trying
14 -- this is Dan McKeel again. What I was
15 trying to show is the 300 millirem dose. I
16 understand that is a cumulative dose and I
17 said that in my little report, but that
18 occurred over a month's period of time. So it
19 was a dose that suddenly appeared on the
20 record. That is the only point I was trying
21 to make and I think I showed one report from
22 April 25, '66 and another snippet of a report

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1 from a month later and the 300 millirem was
2 not on the first one but was on the second
3 one. So I think that is the correct
4 interpretation of that, that it newly
5 appeared.

6 CHAIRMAN ZIEMER: Okay.

7 MR. ALLEN: That is actually not
8 the correct interpretation but it would be
9 hard for a redacted copy to get the right
10 interpretation. And that is actually a
11 different person. When people who were not
12 there or did not turn in a badge, then they
13 were not on the weekly report.

14 DR. McKEEL: Well, then that is a
15 great example. I'm glad we have put this on
16 the record because it is one more example of
17 why overly severe redaction can not only
18 impair information flow but it can actually
19 cause -- and I have said it all along, there
20 is a gray area between protecting privacy and
21 censorship. And I think that is a great
22 example. If that is the truth, then it is

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1 misleading to redact those numbers.

2 MR. KATZ: Well, it may be hard to
3 interpret, Dan, but it is certainly not any
4 intent of the Agency to censor anything other
5 than to protect privacy.

6 DR. McKEEL: Well, the Privacy Act
7 -- Ted, let's not go into that.

8 MR. KATZ: Fine. That's fine.
9 But I am just telling you because I know how
10 things work and there is no one censoring
11 anything.

12 DR. McKEEL: I do, too.

13 CHAIRMAN ZIEMER: Bob, you have a
14 comment?

15 DR. ANIGSTEIN: One comment. To
16 clarify those doses right now apparently we
17 are talking about them, the 2,470 was a single
18 one-week incident.

19 CHAIRMAN ZIEMER: Yes, well, we
20 have discussed that one over and over again.

21 DR. ANIGSTEIN: Okay.

22 CHAIRMAN ZIEMER: Don't go through

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1 it again.

2 DR. ANIGSTEIN: Okay.

3 CHAIRMAN ZIEMER: Okay.

4 MEMBER BEACH: I think John had
5 something, John on the phone.

6 CHAIRMAN ZIEMER: John on the
7 phone had a comment.

8 MR. DUTKO: Yes, one quick
9 comment, Dr. Ziemer. Can you hear me now?

10 CHAIRMAN ZIEMER: Yes.

11 MR. KATZ: Yes.

12 MR. DUTKO: I would like to inform
13 Dr. Anigstein that there is no law that two
14 castings can't be present in the shooting room
15 at one time. We did that many, many times. A
16 transfer car is a lot shorter than a low-boy.
17 Like you saw the Marion axle loader. The
18 Marion axle weighed 96 tons in over four
19 axles. That, of course, couldn't happen.

20 But many times, we had two
21 transfer cars back-to-back at the base of the
22 DL and you could unload castings, either/or.

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1 Thank you, sir.

2 CHAIRMAN ZIEMER: Okay, thanks.
3 That is helpful. Okay, Bob did you have any
4 additional comments?

5 DR. McKEEL: I would like to --
6 this is Dan McKeel. Having heard that answer,
7 what it means is that it underscores what I
8 wrote, that that scenario needs to be modeled.

9 And it can't be passed off and swept under
10 the rug because it is impossible to occur.
11 Not only is it possible to occur, but Mr.
12 Dutko has just testified that it did occur
13 frequently.

14 CHAIRMAN ZIEMER: Okay.

15 DR. McKEEL: Okay?

16 DR. ANIGSTEIN: I want to ask
17 Terry. I don't know if it was clear. I
18 didn't say that you couldn't have a second
19 casting in that room. I was going to say that
20 you wouldn't have a second casting on the rail
21 car on the tracks being radiographed at the
22 same time there was another car just outside

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1 the door. Because the only reason that my
2 understanding from you is that you would
3 radiograph the casting on the car on the track
4 would be to save the time. But since you
5 couldn't get one out and the other one in on
6 the same track at the same time --

7 MR. DUTKO: Comment, Doctor --

8 DR. ANIGSTEIN: -- you would have
9 removed it. You would have unloaded it with a
10 crane and put it elsewhere in the room. I
11 don't disagree with that. I'm just saying
12 that it wouldn't be shot on the railroad track
13 while there was a second rail car just outside
14 the door.

15 MR. DUTKO: Dr. Anigstein, we did
16 not shoot everything on the railroad tracks.

17 DR. ANIGSTEIN: No, but I was only
18 looking at this limiting scenario. Because
19 once it was off the railroad track, the
20 betatron was no longer pointing towards the
21 ribbon -- in the direction of the ribbon door.

22 And I am simply saying that my analysis of

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1 the layout man was --

2 MR. DUTKO: But it is not normal
3 casting work, Dr. Anigstein.

4 DR. ANIGSTEIN: Pardon?

5 MR. DUTKO: A 96-ton casting is
6 not normal.

7 DR. ANIGSTEIN: I know. And then
8 I took that as the limiting case.

9 MR. DUTKO: It was an exceedingly
10 long casting that would limit another transfer
11 car or low-boy of course behind it. But in
12 all other cases, 99 percent of the time we
13 could put two transfer cars back-to-back close
14 by the shooting cell where they could be
15 unloaded by cranes.

16 Many times, sir, many times we
17 have two large turbine hulls in the shooting
18 area. Many times.

19 DR. ANIGSTEIN: Sure. I'm not
20 disagreeing with that. I am simply saying you
21 would unload it with a crane. That was my
22 whole point.

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1 CHAIRMAN ZIEMER: Okay, other
2 questions here? Okay, then are we ready to
3 move -- oh, another comment?

4 DR. ANIGSTEIN: Yes, I am going
5 down the list of Dr. McKeel's --

6 CHAIRMAN ZIEMER: Oh, okay. Finish
7 up your list.

8 DR. ANIGSTEIN: So okay, the
9 question is: the point that Dr. McKeel raised
10 about the 80-curie source. Yes, I have seen
11 some people saying that it was there. Several
12 other workers who gave us extensive
13 information on other things said it was not
14 there. It was not there during that period.

15 So we have it on record, recorded
16 interviews that they said, no, I knew nothing
17 about such a source. If that source had been
18 there, I would have known about it. I don't
19 believe it was ever there.

20 So we have to make a judgment.
21 And the fact that it would have been difficult
22 for the Commonwealth facility to have obtained

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1 an 80-curie source without an AEC license, and
2 we could not trace where it came from. We
3 even went to the extent of saying, well, maybe
4 they got it from another GSI facility and it
5 was like a transfer in between facilities,
6 wasn't legal but maybe they just did it.
7 There was no other GSI facility that had such
8 a source.

9 So we just believe on the weight
10 of the evidence that it was highly unlikely.

11 DR. McKEEL: Well, Dr. Anigstein,
12 this is Dan McKeel.

13 DR. ANIGSTEIN: Well, let me
14 finish.

15 DR. McKEEL: Why did you model it
16 in 2008, if you didn't think it was a valid
17 source?

18 DR. ANIGSTEIN: Excuse me?

19 MEMBER BEACH: He wanted to know
20 why you modeled it.

21 DR. ANIGSTEIN: Back in 2008, we
22 didn't know that. We hadn't gotten the AEC

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1 records. We got the 80-curie records --

2 (Simultaneous speaking.)

3 DR. McKEEL: That means you should
4 have accepted the worker's testimony.

5 DR. ANIGSTEIN: The information
6 was always contradictory. Some people said
7 yes. Some people said -- we heard in my
8 interview with the workers back in 2007, I
9 heard there was an 80-curie source, so I put
10 it into the model. I later learned that the
11 80-curie source came after the covered period.

12 And several workers said it was not there
13 earlier. Some said it was. We just made that
14 judgment.

15 CHAIRMAN ZIEMER: Well, we have
16 had these discussions before. We know there
17 is conflicting testimony on that source.
18 There is also some conflicting testimony on
19 presence of the iridium source. So we have
20 both on the record.

21 DR. ANIGSTEIN: Okay, I can go
22 down the list. The radium-226, the small

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1 radium-226 sources, the analysis that was
2 performed, certainly the analysis that SC&A
3 performed is a bounding analysis. It already,
4 whether occasionally or frequently the sources
5 were taken out of the shooting room, the one
6 radiographer said it happened very rarely. As
7 long as NIOSH has now adopted a policy and
8 they will assign the maximum dose for any
9 given period to all workers, it is irrelevant.

10 Because the same person that said they shot
11 outside the shooting room also said they set
12 up a two mR per hour boundary so the workers
13 would not be exposed to -- they were actually
14 exposed to a higher dose rate from that
15 radiographic room in 206 -- in Building 6 if
16 they happened to be right outside the door.

17 And both Dave Allen and I
18 independently analyzed okay, let's say nobody
19 is watching the store and sometimes the worker
20 is going to cross that boundary. We analyzed.

21 We calculated the doses. They are small.
22 They are very small additional doses. You

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1 know, no worker -- it is highly unlikely the
2 worker will deliberately go and say here is a
3 nice place. I'm going to sit on top of the
4 source and have my lunch. That is ludicrous.

5 DR. McKEEL: Actually, there is
6 testimony that in fact people walked through
7 there all the time when the source was in
8 there.

9 DR. ANIGSTEIN: Well, the same
10 person would not have been next to, staying
11 for eight hours next to that source. They
12 might have been walking past it, and we
13 accounted for that. And it is a very small
14 additional dose, and it is far less than the
15 limiting dose to the radiographer.

16 DR. McKEEL: Well, once again, I
17 have just got to put on the record --

18 DR. ANIGSTEIN: You may not
19 believe our analysis, but they are on record.

20 They have been reported by NIOSH. They are
21 reported by SC&A.

22 DR. McKEEL: I don't think the SEC

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1 issue is whether SC&A can calculate that dose.

2 And that is not -- the thrust of my comment
3 was that NIOSH hadn't modeled it correctly.

4 DR. ANIGSTEIN: Yes, they have.

5 DR. McKEEL: Oh, okay.

6 DR. ANIGSTEIN: And the point is
7 it is limited. It is limited by the dose to
8 the radiographer. And then the next item, the
9 iridium-192 source, it would have been, again,
10 as I recall, would have been even more
11 difficult for GSI to have obtained an illegal
12 iridium-192 source. There would have been no
13 point to it because it is only good for a few
14 months, then it has to be sent back to a
15 facility that has a nuclear reactor and they
16 will take the iridium metal and will re-
17 irradiate it to refresh to boost up its
18 activity so it can be used again.

19 And all of this was going on
20 illegally, hidden from the AEC, you are having
21 a criminal enterprise --

22 DR. McKEEL: Dr. Anigstein, if I

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1 hadn't h've gotten those 1,016 pages of NRC
2 2010-0012, you wouldn't have even known about
3 a lot of the sources that were there. You
4 wouldn't have even known about the radium-226
5 sources.

6 DR. ANIGSTEIN: As it happened --

7 DR. McKEEL: I showed you, I sent
8 the Work Group an excerpt from the 1968
9 renewal application from GSI that said this
10 site was licensed for iridium and cobalt. And
11 the reaction was, oh, well, that was past the
12 covered period. But actually if you think
13 about the words, it didn't say when it was
14 licensed. It just said it is licensed for.

15 DR. ANIGSTEIN: It is licensed as
16 of the moment.

17 DR. McKEEL: I am saying that plus
18 I gave you four new worker affidavits.

19 DR. ANIGSTEIN: Right.

20 DR. McKEEL: So, again, if you
21 ignore that and disbelieve that and your
22 argument about the half-life and not being

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1 practical, I just point out to you that you
2 all easily accept that St. Louis Testing had
3 an iridium-192 source.

4 DR. ANIGSTEIN: Why not?

5 DR. McKEEL: You haven't gotten
6 their license. You haven't looked at that.

7 So maybe if you tried harder, you
8 would get the GSI iridium-192 source license.

9 DR. ANIGSTEIN: Okay.

10 DR. McKEEL: I can't do
11 everything.

12 DR. ANIGSTEIN: Dr. McKeel, number
13 one, just for the record and I haven't said
14 this before, I did go to the NRC and made --
15 and requested information on GSI.

16 DR. McKEEL: I understand that,
17 but you didn't get the records.

18 DR. ANIGSTEIN: Just a moment.
19 Let me finish, please. They told me that they
20 have already fielded such a request from you.
21 They gave me your name and said they had
22 already searched all their records and they

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1 found nothing.

2 Consequently, I didn't bother. I
3 said why waste going through the paperwork if
4 they have already told me they already made
5 that search. Now the reason they found
6 nothing is that it had the incorrect name.
7 Your original request to them was under
8 General Steel Castings. They searched that
9 name. They got nothing.

10 When I asked them about General
11 Steel Castings or General Steel Industries,
12 they said they already searched for it, and I
13 did not pursue it only for that reason.

14 Now I find out you went back and
15 used the correct name, which I think you
16 deserve credit for, but it is not that we
17 didn't think of it. We were thrown off the
18 trail by your original request under the wrong
19 name.

20 CHAIRMAN ZIEMER: Well be that as
21 it may, let's proceed here. Any other
22 comments, Bob, on any of the other issues?

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1 DR. ANIGSTEIN: Yes. Well anyway
2 and as far as the iridium-192 going on, we
3 have a continued -- in the records which you
4 finally obtained, there was a continuous
5 sequence of license amendments. The original
6 license, amendment one, amendment two,
7 amendment three. There are no missing
8 numbers. And the first one that mentions the
9 cobalt-80 -- the 80-curie cobalt-60 source and
10 mentions iridium is the amendment that was
11 issued in 1968. The previous, the one number
12 just before it does not mention that and
13 mentions only cobalt-60 not to exceed one
14 curie.

15 My personal opinion is what they
16 obtained was a camera, which means a big lead
17 shield with mechanism for the sources to be
18 removed -- to stick out and be retracted. And
19 that camera was actually designed both for
20 cobalt-60 and for iridium-192. I forget the
21 name of the company now that made it. It had
22 two channels, and there was one for each

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1 source. So having a camera that could hold
2 both, they apparently decided that they might
3 as well, in case they want to in the future
4 have it, they are licensed for it. But that
5 was only in 1968.

6 DR. McKEEL: Well I would suggest
7 that that one license that's after the cobalt-
8 60 license, that could have been one license.
9 But for instance, when I was involved with
10 the Dow SEC, they had numerous licenses.

11 DR. ANIGSTEIN: That's not true.

12 DR. McKEEL: And so they could
13 have easily had a different license that is
14 not recoverable by DOE, not recoverable by
15 NRC, which many of their records are not. So
16 once again, we have made this point in many
17 other scenarios to the Board that the absence
18 of a particular record does not mean the
19 record never existed.

20 It doesn't mean it did exist but
21 against that and using that reasoning you also
22 have to deny the testimony of a number of

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1 people, not just the gentleman that Dr. Ziemer
2 interviewed and later retracted and said he
3 meant cobalt instead of iridium, but we have
4 other people who made affidavits about there
5 being a GSI iridium source on different
6 occasions over a long period of time from the
7 1950s forward. And I am saying that to be
8 claimant favorable, if you really believe that
9 that is what the job is, then the claimant
10 favorable thing to do would be to calculate
11 those doses and show that you can do that.

12 And, again, I view that as the job
13 of NIOSH. So my statement still stands. I
14 don't think they have done that, and I think
15 they need to do that.

16 CHAIRMAN ZIEMER: Okay, Bob, any
17 other points?

18 DR. ANIGSTEIN: I think I will
19 stop.

20 CHAIRMAN ZIEMER: Okay.

21 MR. RAMSPOTT: Dr. Ziemer?

22 CHAIRMAN ZIEMER: Yes.

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1 MR. RAMSPOTT: John Ramspott. If
2 I may, on the one topic Bob mentioned, the
3 radium source.

4 CHAIRMAN ZIEMER: Yes.

5 MR. RAMSPOTT: Just to set the
6 record straight or publicly spell it out a
7 little bit, the gentleman that said the radium
8 was seldomly used outside the building was a
9 part-time radiographer who worked primarily on
10 weekends. And the gentleman who everybody
11 acknowledged he actually was that gentleman's
12 supervisor, ' identifying information
13 redacted', told us on record at the last Work
14 Group meeting, I believe, that they used
15 radium any time they needed to. They used any
16 of the sources, the small sources, anywhere in
17 the plant, they could do it.

18 He is also the gentleman who said
19 yes, I set up a perimeter. Then the guy who
20 was teaching me the ropes, we both left. We
21 went and did our other jobs. So setting up a
22 perimeter is only as good as if you are there

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1 watching it.

2 And then the other item that he
3 confirmed was the radium source was actually
4 stolen or taken out of 10 Building. He
5 actually had to go report it to upper
6 management and that is when the big search
7 started for the missing radium plumb-bob. It
8 was radium that was used in the plumb-bob.

9 So to say the sources are pretty
10 much used in the 6 Building radiograph room,
11 that is far-fetched and totally wrong.

12 CHAIRMAN ZIEMER: Okay, thanks
13 John.

14 MR. RAMSPOTT: Thank you.

15 CHAIRMAN ZIEMER: Okay, I would
16 like to move to the matrix, if you would pull
17 that out.

18 There are ten items in the matrix,
19 one of which we had previously closed. We
20 have a summary that SC&A added on page five
21 where they talked about the importance of the
22 issues and highlighted Issue 1 and 6. They

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1 also indicated that they recommended closing
2 Issues 4 and 5, although in your narration you
3 also made a similar recommendation for 2 and
4 3. So those are in there. And 2, 3, 7
5 through 9 are identified as being of medium,
6 what's the term, importance, whatever that
7 means. It is kind of an arbitrary term.

8 I think we will just go through
9 them in order, even though you have 1 and 6 as
10 highest importance. I think that is easier
11 just to go through them in order and see what
12 questions we have and what issues are still
13 opened up.

14 Issue 1 had to do with monitoring
15 data or more particularly what was identified
16 as lack of monitoring data for the early
17 years, which would be '53 to '63, maybe late
18 '62. The cutoff may not be quite so clear.
19 But in that time range. And during that
20 period, you have the betatrons in use and you
21 have the radium radiographic sources being
22 used.

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1 DR. McKEEL: And you have the
2 iridium.

3 CHAIRMAN ZIEMER: And the
4 petitioner also indicates they believe that
5 iridium was used at least in part of that
6 period.

7 Now as I understand SC&A -- I am
8 going toward the end of the matrix here, SC&A
9 say that they believe it is possible to
10 reconstruct doses during the early years using
11 the bounding calculations. In this case, they
12 would use the bounding calculations for radium
13 for all the workers and then you would use, I
14 guess, the betatron values for the betatron
15 workers.

16 MR. ALLEN: It was actually just
17 every scenario. We picked the highest
18 essentially is what is going to be.

19 CHAIRMAN ZIEMER: Every scenario
20 of the --

21 MR. ALLEN: If the radiography was
22 going to give you more than betatron or layout

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1 worker --

2 CHAIRMAN ZIEMER: Right. In other
3 words, if the person for a particular organ --

4 MR. ALLEN: It would be for a
5 particular case.

6 CHAIRMAN ZIEMER: -- or for a
7 particular case, if they got more from the
8 dose assigned by the radium model, you would
9 assign that even if they were a betatron
10 worker.

11 MR. ALLEN: Yes, because I don't
12 think it was ever --

13 CHAIRMAN ZIEMER: It wouldn't be
14 distinguishing between them.

15 MR. ALLEN: I don't think you can
16 -- it would be pretty tough in probably any
17 time frame to distinguish a betatron operator
18 from source radiographer. I mean they did
19 some of that interchangeably. Some
20 concentrated on betatron, but they did get a
21 little bit of source and most you just flat
22 wouldn't know.

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1 CHAIRMAN ZIEMER: Okay.

2 DR. MAURO: A little qualifier
3 here, and Bob certainly --

4 CHAIRMAN ZIEMER: Well there also
5 is, part of your recommendation is that the
6 '53 through '56 period you say it is not clear
7 that bounding exposures can be assigned during
8 that time period. And I certainly want to ask
9 how do you see the first three years of that
10 as being different from the next five or six?

11 DR. ANIGSTEIN: Okay, the main
12 reason being that we have next to no
13 information during the first four years.
14 However, starting with '56 we have the one
15 gentleman whom we interviewed, who gave a very
16 good account. He did the radium radiography.
17 He gave a very clear description of how it
18 was done. And he turned over his accumulated
19 exposure records.

20 We started by looking at it and
21 carefully he recalled coming, he said he had
22 come to work at GSI. He was laid off. He

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1 went into the Army. He came back in '56 and
2 went back to work for GSI. All right, the
3 earlier years he had not done any radiography.
4 Later he did.

5 But his record starts with -- it
6 was produced in 1962 when the Nuclear
7 Consulting Company came onboard and they
8 applied for the AEC license. So I guess a
9 part of the process they produced this record
10 and they looked at -- they just said records.

11 So they must have had earlier records which
12 they examined and they had 18 quarters. So if
13 you back calculate, this was done early in '62
14 so it was not a full quarter again. So 18
15 quarters would be four and a half years. So
16 this would put us into the middle of 1957. So
17 therefore it was most likely that this person
18 started, he had other duties at GSI, started
19 doing radiography in 1957. So that just seems
20 like a good break point.

21 And by using his exposure record
22 and taking into account the fact that he

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1 worked most weekends one or two days. He said
2 he worked as much as he could. He didn't say
3 he worked every single Saturday and Sunday all
4 year, but he worked most weekends and often
5 more than one shift during the weekend.

6 So if you can take his record and
7 then prorate it to a full-time worker, you
8 come with something about, my memory of the
9 record, something up to 20 rem a year could
10 have been. So that is one piece of evidence.

11 The second piece of evidence is
12 the statement made during a site visit made to
13 the AEC inspector that they have maintained
14 records ever since they had this film badge
15 program going back. We know -- we have good
16 evidence it was there in 1953 because we have
17 a photograph taken in 1953 of a betatron
18 operator, and it very clearly appears that he
19 is wearing a film badge on his belt.

20 And they said that during that
21 period the then applicable -- they were very
22 careful to qualify that each year they kept

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1 track of what the AEC rules were, even though
2 it didn't apply to them and they made sure
3 that they stayed within the limits for that
4 year. So at one point it was 15 rem and then
5 later on it was essentially 12 rem because it
6 could be 3 rem a quarter. So they said they
7 always stayed within that. And they said they
8 were never exceeded, which led to the
9 possibility that they might have reached
10 somewhere near that limit and on average for
11 25 percent. So I take that as a second piece
12 of evidence saying during these years it was
13 probably 12 rem would be a good upper limit.
14 And that is within the range of the
15 extrapolated readings from this one person who
16 worked on the weekends. So that was the
17 second piece of evidence.

18 And the third piece of evidence is
19 the model which I showed earlier my diagram of
20 that room where I modeled here is the man --
21 well the source is inside a deep well inside a
22 lead shield so -- a little external radiation.

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1 He lifts it out, holds it four feet away from
2 his body, brings it in, puts it down next to
3 him, puts it back. In-between shots he is in
4 that concrete room but without any steel
5 shield and that comes out to about 12 rem a
6 year.

7 So when you get that much
8 coincidence, you say you know, that looks like
9 a pretty robust model.

10 And prior to the record to the
11 verbal testimony of this gentleman and prior
12 to this record, we really don't have any
13 information. We still say, yes, they probably
14 didn't exceed the limits, but that is only one
15 leg of a three-legged stool and now we have
16 all three legs.

17 And you can say, well, can you
18 trust their testimony. They would not have
19 likely lied to the AEC inspector when he could
20 simply say is that what you are telling me?
21 Let me see those records. So it seems
22 unlikely that they would have. They

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1 volunteered that information. They weren't
2 required to give it because the radium use was
3 not under AEC control.

4 All in all it seemed like a very
5 believable story that from mid-'57 to
6 somewhere, you know, we can talk about the
7 exact number but something on the order of 12
8 rem from mid-'57 to mid-'62, it would be a
9 five-year period, would probably be bounding.

10 Starting with May '62, you have the cobalt-60
11 sources, which were much more tightly
12 controlled that were using these lead shielded
13 cameras, the exposures were much lower. And
14 as a matter of fact, this gentleman's film
15 badge records for as soon as the cobalt-60
16 sources dropped dramatically from a rem a year
17 to a millirem a year.

18 And then if we just say in rough
19 numbers let's consider, even though they
20 started using the cobalt in '62, let's assign
21 the annual dose for all of '62 the same as for
22 the previous years. And then in '63 already

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1 you have the betatron. True, it is toward the
2 end of the year but if we just say this time,
3 we don't know exactly when, let's assign it
4 for the full year. And we have again, by this
5 model that I showed you a little earlier, 9.2
6 rem -- 9.2 R per year.

7 So all of those periods are
8 covered and with very claimant-favorable
9 exposure estimates. And so that would seem to
10 be a good break point.

11 CHAIRMAN ZIEMER: I will add one
12 comment. I went back and looked at Dr.
13 Konneker's letter which is part of the -- I
14 think January '63 was the date on it. It was
15 part of the application for the AEC license.

16 DR. ANIGSTEIN: Well he followed
17 it up with a survey.

18 CHAIRMAN ZIEMER: Yes, but --

19 DR. ANIGSTEIN: But the license --
20 they got the sources in May, I believe in May
21 of '62.

22 CHAIRMAN ZIEMER: But there is a

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1 statement in his letter that says and he is
2 talking about the training courses and the
3 film badges. He says the training course has
4 been used successfully for 15 years and the
5 published dose limits were followed. The
6 published dose limits --

7 DR. ANIGSTEIN: Yes, that is what
8 I said.

9 CHAIRMAN ZIEMER: -- these are
10 NCRP or --

11 DR. ANIGSTEIN: They meant AEC, I
12 believe.

13 CHAIRMAN ZIEMER: Well it could
14 have been AEC also.

15 DR. ANIGSTEIN: In another place
16 they --

17 CHAIRMAN ZIEMER: If you go back
18 15 years, yes it could be either one. It says
19 the published dose limits were followed. And
20 it also said no one has exceeded these limits.

21 Now if he goes back 15 years from
22 1963 --

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1 DR. ANIGSTEIN: I see.

2 CHAIRMAN ZIEMER: -- you are
3 actually back to '48 --

4 DR. ANIGSTEIN: Right.

5 CHAIRMAN ZIEMER: -- which is
6 prior to this date.

7 But all I am saying is that
8 Konneker suggests that whatever that program
9 was was being followed earlier.

10 DR. ANIGSTEIN: Oh, okay.

11 CHAIRMAN ZIEMER: That is all I am
12 saying.

13 But there is not any -- you have
14 some sort of independent evidence. Two
15 things. You have that person's film badge
16 records --

17 DR. ANIGSTEIN: Yes.

18 CHAIRMAN ZIEMER: -- and we do
19 have the photograph of '53 showing or '56 --

20 DR. ANIGSTEIN: 1953.

21 CHAIRMAN ZIEMER: Yes, '53.

22 DR. ANIGSTEIN: And also I have,

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1 you are going by Konneker's letter which I
2 must have -- I probably -- I'm sure I saw it
3 but I was going by a part of the AEC
4 application where they had made this statement
5 to the AEC, where the person in charge of the
6 program, a GSI official, made that statement
7 to AEC that they've always followed -- that
8 they followed the AEC rules. They followed
9 the AEC limits.

10 CHAIRMAN ZIEMER: Right. This
11 letter was in connection with a survey that
12 Konneker did.

13 DR. ANIGSTEIN: Yes. It is not
14 contradictory.

15 CHAIRMAN ZIEMER: Right.

16 DR. ANIGSTEIN: As a matter of
17 fact, I think it reinforces it.

18 DR. McKEEL: Dr. Ziemer, this is
19 Dan McKeel.

20 CHAIRMAN ZIEMER: Yes?

21 DR. McKEEL: Let's see, my comment
22 would be as follows. I really find it

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1 astounding that we are basing an argument that
2 you can bound doses based on letters and a
3 photograph. I'm sorry, I just have to put
4 this on the record.

5 The Board has given SECs to many
6 sites that have far more hard film badge data
7 with neutrons and everything. This is really
8 ridiculous.

9 I'm sorry. I understand words and
10 what they are meaning, and I hate to use a
11 term like that, and I am using this in terms
12 of scientific proof and good science. This is
13 terrible.

14 You are saying that one man's film
15 badge records. You can't even substantiate
16 the program. You don't have any other
17 reports. It happens to be this one fellow
18 volunteered this material to us and we gave it
19 to you. That's fine.

20 But to base an entire seven years
21 on that and then to say that to base it also
22 on Dr. Konneker's letter, if Dr. Konneker was

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1 accurate, then where is all that data? You
2 know, did it just go away? Did it vanish in
3 thin air? There is no evidence of that film
4 badge data. And to say that a letter that a
5 self-serving company is providing with their
6 license application is absolutely ridiculous.

7 Now I know, as a matter of fact,
8 from interacting with the Hematite site in the
9 early days, back in the early '50s and so
10 forth, that they were required from day one to
11 hold on to their film badge records. Yes, the
12 AEC may have gotten a copy, but that site had
13 to hold on to their own film badge records.
14 And what is totally missing, what is totally
15 absent is any evidence that that data actually
16 existed at GSI.

17 So when Dr. Konneker says they
18 have been having a program like that for 15
19 years, I'm sorry. We had an opportunity to
20 interview him. We had a deal set up. Dr.
21 Anigstein was going to call him; Dave Allen
22 was going to interview him; and I was going to

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1 listen in. That interview was aborted. Dr.
2 Anigstein had a talk with Dr. Konneker, but
3 not Dave Allen, and I wasn't even allowed to
4 participate other than to listen. And I
5 didn't even get that opportunity.

6 But if I had talked to him, I
7 would have asked him questions like that. You
8 know? I mean, I don't think that stands up at
9 all.

10 And I will just point out another
11 thing. We have direct testimony from '
12 identifying information redacted' is one and
13 other workers who absolutely contradict that
14 idea that there were annual AEC training
15 courses. There was not. There was a lecture
16 that Dr. Konneker gave at Washington
17 University that ' identifying information
18 redacted' said he attended with three other
19 supervisors. The other three supervisors
20 flunked the written test, and he passed.

21 But the point is that that is the
22 only evidence we have on the record of any

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1 worker ever taking a written test.

2 Now yes, does the license
3 application say that that was done all the
4 time? Yes, it does. Is there any proof that
5 it ever happened? And there were men who
6 lived back in that era. No, there is not. '
7 identifying information redacted' was the only
8 one. He said there were three people there.

9 So I think that to accept that
10 kind of data, I hope this Work Group won't do
11 it, and I am going to argue until the last
12 vote is cast that the full Board does not
13 accept that kind of evidence.

14 I think the fact is you have no
15 hard evidence from 1953 up through 1962 that
16 would stand up in court. And an n of one to
17 base seven years of denying an SEC on is just
18 not acceptable scientific reasoning, and I
19 hope you won't do it.

20 I guess that's all I want to say.

21 CHAIRMAN ZIEMER: Okay.

22 MR. RAMSPOTT: Dr. Ziemer?

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1 CHAIRMAN ZIEMER: Yes.

2 MR. RAMSPOTT: I would like to add
3 something to that, if I could.

4 The worker, again I don't want to
5 beat a dead horse, but you have got one
6 worker's badge records. He is a part-time
7 worker, part-time radiographer. And what do
8 you do when he is part-time? They do look at
9 these badges weekly. If he is not there and
10 then all of a sudden he goes there on
11 Saturday, his weekly badge report is going to
12 look pretty good, even if he got a dose, a
13 heavy dose because it would be divided by
14 seven days instead of one. I mean, that is
15 almost fictitious.

16 You know, and now I am actually
17 looking at a magazine here in front of me, and
18 I know I have provided it to SC&A, NIOSH, I
19 think yourself. I can email it to you in about
20 a minute. It is dated 1964. And the one
21 source that you are referencing as a
22 radiographer, it states in here these

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1 Commonwealthers have just completed the first
2 isotope training course. This is 1964 March.
3 Here is Mr. Powers. Here is Mr. Leroy Dell.
4 Here is all these guys in here. A whole crew.
5 1964. This guy that wrote a letter and said
6 they went back to 1948 is on drugs. He's way
7 off. I'm going to email this to you here in
8 about a second. I will send it to Ted. It is
9 1964.

10 CHAIRMAN ZIEMER: I think we have
11 seen that actually. The only point I was
12 making, I think Bob was making, was not that
13 we would base an SEC or not an SEC on these
14 pieces of data. The question is whether or
15 not there was any kind of monitoring going on
16 during those early years.

17 MR. RAMSPOTT: It said the
18 Commonwealthers pictured here were the first
19 to successfully -- the first to successfully
20 complete a 32-hour course in radiation health
21 physics. This is 1964, and this is the first
22 class. And it names all these guys we are

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1 talking about. It names the guy with the
2 massive dose that starts with a P. James
3 Powers is in here. I mean, these guys weren't
4 trained, not until `64. This is a magazine.
5 I heard this, I can't even believe it. This
6 is ludicrous.

7 See what GSI does? They say there
8 was a building 1,000 feet away and they forget
9 the one that is 40 feet away. They would do
10 anything to get a license. I'm more upset
11 because no one came out and looked. They
12 wouldn't have put that new betatron where it
13 was if somebody had come out there and looked.
14 There is a reason the United States government
15 and the Army put one out in a field.

16 CHAIRMAN ZIEMER: Okay, we hear
17 you, John.

18 MR. RAMSPOTT: All right. Thank
19 you.

20 CHAIRMAN ZIEMER: Any comment,
21 Bob?

22 DR. ANIGSTEIN: Yes. First of

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1 all, there was a letter or a report from Dr.
2 Konneker that he had both instructed and
3 tested, and there were eight workers who
4 qualified on the very first AEC license -- or
5 the second one. The first one didn't identify
6 who the workers were.

7 And the supervisor was not one of
8 them. He came later. And he said he tested
9 them. There was nothing about he gave a
10 course at St. Louis University -- at
11 Washington University. I believe that
12 gentleman in his memory is mistaken. The
13 courses would have been given at -- he came to
14 GSI. This is where he was hired as a
15 consultant, and this is what he did. And he
16 tested them, and he said there were eight that
17 qualified.

18 The one going back 15 years they
19 said in the various AEC applications that they
20 had informal training; meaning you can take
21 that whatever, on-the-job training, some
22 discussions. They did not say they had a

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1 formal program with testing.

2 Konneker put in the first formal
3 program with testing. So if that magazine was
4 '64, perhaps they were referring to something
5 that happened slightly earlier. I'm sure I
6 can pick out the dates. I haven't got them in
7 front of me at my fingertips right now. I
8 don't want to hold up the meeting for that.
9 But there is nothing there that is
10 contradictory. They had first informal
11 training. He went over the records and said
12 this was not, or he was told that there was
13 nothing earlier. And then as far as the
14 interview with Dr. Konneker, he basically said
15 each and every question I really don't
16 remember. He had no, I asked him do you have
17 records, no. He didn't even remember where he
18 got his film badges.

19 You get somebody 50 years later, a
20 gentleman 90 years old sounded very, very
21 feeble. He could barely get his words out. I
22 did not think it was -- as a matter of fact,

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1 Dr. Ziemer instructed me to contact him first
2 to see if he had anything useful to say and
3 then maybe we would set up a formal interview
4 with NIOSH and Dr. McKeel participating. And
5 there just didn't seem to be any point in
6 bothering him. Nothing more he could tell us.
7 He said at the end, I'm sorry I couldn't
8 really help you.

9 CHAIRMAN ZIEMER: We can't beat
10 that horse to death. You have the information
11 that is in the document. You have heard the
12 discussion. You have heard the points from
13 the petitioners. You have heard the
14 discussion here.

15 Let me ask the Work Group Members,
16 what would you like to do on the Issue 1?
17 Currently it is open. SC&A's recommendation
18 is to accept the bounding for the second half
19 of that period but not the first half I think
20 is basically what I would interpret your
21 recommendation to be.

22 DR. ANIGSTEIN: Yes, following '57

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1 on.

2 MEMBER BEACH: Well from my point
3 of view, Paul, I don't agree with the
4 recommendation that the second half, '57 to
5 '62 is boundable. I think the evidence is too
6 flimsy from my personal opinion, and I think
7 that we should recommend that the SEC be
8 passed for '53 through '62 on that issue for
9 number 1.

10 CHAIRMAN ZIEMER: Through '62?

11 MEMBER BEACH: Yes. That is my
12 personal opinion.

13 CHAIRMAN ZIEMER: Okay. And
14 Wanda, what are your thoughts on that?

15 MEMBER MUNN: I have a tendency to
16 believe we have adequate information to be
17 able to bound, although we do not have the
18 kind of records we would like to have for the
19 early years. That is frequently the case.

20 We do, however, I believe have
21 enough information about sources for those
22 early years to be able to make a logical

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1 bounding estimate.

2 I would like to hear what NIOSH
3 feels with response to the SC&A
4 recommendation. We haven't had an opportunity
5 to really probe that.

6 MR. ALLEN: As far as my opinion
7 on this, I actually think Bob laid it out
8 fairly decent as to what the information is,
9 and we have put our best estimate forward for
10 those early years. And I am not going to
11 pretend that it's iron clad 100 percent
12 accurate, and I am also not going to pretend
13 to know what is sufficiently accurate. That
14 is unfortunately your job, Wanda.

15 MEMBER MUNN: Yes, I recognize
16 that. But my job relies on the information
17 that we have in front of us with respect to
18 source terms. And it seems to me that we have
19 done a -- does NIOSH not feel comfortable with
20 the source terms that we have. We are fairly
21 sure that we have covered those bases well.
22 Correct?

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1 MR. ALLEN: I believe we have got
2 the source terms. I also, I still believe in
3 our estimate as a reasonable estimate. Bob's
4 opinion seems to be that we have information
5 about practices, et cetera, back to '57-ish.
6 My opinion was those practices didn't come out
7 of thin air in '57. You know, they are based
8 on what was going on prior to that. They
9 didn't reinvent the wheel in '57. There is
10 nothing that happened in '57 that we can find
11 that really changed anything. So, yes, I am
12 back extrapolating those practices to '53.
13 That is where my opinion is.

14 And like I said, I know that is
15 not bullet-proof. It is not 100 percent. Bob
16 wanted something more significant.

17 DR. ANIGSTEIN: The only point I
18 would make about that is the second-hand
19 account of the missing radium source, which is
20 there was some question to the validity
21 because it was always, I heard this from
22 someone. Everybody who said that gave an

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1 account that they heard it from someone else.

2 But the best account was again
3 from the same person whose badge records we
4 have who said it happened when he was away in
5 the Army and when he came back there was a
6 lock on the door.

7 So, you might look at that as a
8 watershed moment that they improved their
9 security and not so much that the radiography
10 practices were different but that perhaps the
11 controls were a little more lax.

12 There is question in my mind
13 whether that incident actually happened at
14 GSI. We know it happened here earlier at
15 Eddystone. Eddystone was the same company and
16 it is not inconceivable that the word simply
17 went to the Granite City facility saying you
18 better watch your radium sources because here
19 we had a case and the word got around. And
20 then second, third-hand next generation of
21 workers heard about it and thought that it
22 happened there. I'm just saying it is a

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1 possibility.

2 MEMBER MUNN: Yes, I doubt that we
3 have the information that can assure us of
4 that one way or the other, although I do
5 understand how stories of that type take a
6 life of their own and spread from one site to
7 the other, but I would not go so far as to say
8 that is a probability here.

9 Even though we assume that that
10 may indeed have occurred, I --

11 DR. ANIGSTEIN: In which case,
12 there would be a reason for that being an SEC
13 period because the controls were more lax than
14 later.

15 CHAIRMAN ZIEMER: In either case,
16 even if you had no information about either
17 the lock or the one person whose records you
18 have or the Konneker letter about the training
19 and so on, the bounding is not dependent on
20 any of those.

21 MEMBER MUNN: No, it isn't.

22 CHAIRMAN ZIEMER: My question to

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1 SC&A and to NIOSH, I know NIOSH's answer, I
2 guess you were only thinking of that in terms
3 of whether or not the controls were inherently
4 tighter and you would feel a little more
5 comfortable about bounding under conditions
6 where they were perhaps more controlled.

7 The bounding methodology would be
8 no different in the first three years in the
9 next six years if you went with bounding.
10 Isn't that correct?

11 MR. ALLEN: That's correct.

12 CHAIRMAN ZIEMER: You are not
13 dependent at all on any of those records that
14 Bob has got --

15 DR. ANIGSTEIN: Exactly.

16 CHAIRMAN ZIEMER: -- or any of
17 those letters, anybody's training program, any
18 locks or lack thereof. Your bounding
19 methodology is the assumptions about -- well
20 assumptions, the idea that the radium when it
21 was used outside the room was roped off. That
22 is sort of inherent in the control issue.

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1 MEMBER BEACH: That's an
2 assumption also.

3 CHAIRMAN ZIEMER: Yes, it is. It
4 is.

5 MEMBER BEACH: So what I heard
6 though was the back-extrapolation that you
7 would take data from '62 and back-extrapolate
8 to the 1953 time period or that 11-year
9 period.

10 MR. ALLEN: No, it is the portable
11 sources, I'm trying to recall, I don't think
12 it was really -- not sure I'm going to be able
13 to remember this --

14 MEMBER BEACH: I just wanted to
15 make sure I heard what I thought I did.

16 MR. ALLEN: It wasn't based on --
17 The data that we used was the scenarios the
18 workers gave us as far as practices, et
19 cetera, roping it off, that people walked
20 through the barriers.

21 MEMBER BEACH: Right.

22 MR. ALLEN: The number data, the

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1 values that we used that came after that was I
2 think the only one we really used was the NRC
3 document thing and it was 500-millicurie
4 sources, which I don't think anybody has
5 actually disagreed with that or anything.

6 And Bob you can correct me if my
7 memory is wrong but from that and the fishing
8 pole techniques, etcetera, it was all the
9 worker information that we got on their
10 practices and what we based our exposure
11 estimate on.

12 Like I said, I don't know of
13 anything that really changed in '57. We
14 didn't use really film badge data or anything,
15 if that is what you were saying from pre-'62
16 or anything. We just used the practices and
17 the source terms.

18 MEMBER BEACH: I just heard back-
19 extrapolate. So I wanted to make sure I
20 understood what you were saying earlier.

21 MR. ALLEN: I think what I meant
22 was back extrapolate the work practices.

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1 MEMBER BEACH: Well that's fine.
2 I got that.

3 CHAIRMAN ZIEMER: John?

4 DR. MAURO: There is one thing I
5 did want to say. I like the place that SC&A
6 is in and NIOSH is in. I think that we have
7 exhausted the fact-finding. What I mean by
8 that is to try to bring to the table the
9 history of this, including Dr. McKeel and all
10 of the GSI folks what we did is collect facts
11 and do calculations, explore the probe and try
12 to place into a big basket everything we know.
13 And I think you have it.

14 I don't think there is much more
15 that your contractor or that NIOSH can tell
16 you in order to collect more information that
17 will help you make your judgments.
18 Unfortunately, I think that, and I agree with
19 everything I am hearing around the table,
20 certainly there is some softness before 1962.
21 And the way we see it, it is really soft in
22 my opinion from '53 to '57 or '56; not so soft

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1 from '57 to '62 and things get pretty good at
2 '62.

3 And I mentioned this at one of our
4 earlier meetings and I still feel that way.
5 The difficult part is what you have in front
6 you right now. This is the facts. This is
7 what we have got. Now it becomes a judgment
8 and it is almost a personal judgment. I don't
9 know if there is anything more that we can do
10 to gather any more information, do any more
11 calculations, do any more surveys. Maybe but
12 I have got to say I don't see it.

13 Now it is really a tough call.
14 And in my opinion, Bob and I struggled with
15 this, you know, can you go all the way back to
16 '53 given the information? I walk away saying
17 no. And the reason I say no was 'identifying
18 information redacted''s testimony
19 about his concern about lack of controls, the
20 lost source that might or might not have
21 occurred. And that is why I had this elbow in
22 1956 and '57 because things seemed to be soft,

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1 very soft at that time.

2 But I can see someone saying,
3 Wanda, yes, no we can go back, you know, for
4 the reasons we all talked about. And I could
5 also see someone saying from '57 to '62 that
6 is not good enough for me.

7 So I could see. I'm trying to
8 look at it through your eyes but I don't think
9 there is very much more we can do. Sort of
10 the card is now, as far as I am concerned, in
11 your hands. There might be a couple of things
12 you may want us to follow up on but I think we
13 are almost there in terms of fact-finding.

14 MEMBER MUNN: To answer your
15 question specifically, given the information
16 that we have, given the understanding we have
17 of the sources, and we are fairly certain of
18 those, and given the understanding of the
19 practices that were intact in '57 and
20 afterwards, the bounding process is a
21 perfectly legitimate one and certainly spreads
22 enough umbrella to be sufficiently accurate,

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1 in my view.

2 CHAIRMAN ZIEMER: For '53 to '62?

3 MEMBER MUNN: Yes.

4 CHAIRMAN ZIEMER: Because right
5 now we are talking about --

6 MEMBER BEACH: Well SC&A has said
7 they don't think '53 to '56 is doable --

8 CHAIRMAN ZIEMER: Right.

9 MEMBER BEACH: -- but '57 to '62
10 is.

11 DR. ANIGSTEIN: Can we make a
12 change? Can we amend?

13 DR. MAURO: Well we can do
14 whatever you want.

15 DR. ANIGSTEIN: I would say that
16 it is a little less firm, there is less
17 evidence but I agree with Dave Allen that
18 there is no reason to believe there was a
19 change of practices. And it is basically this
20 is something we wouldn't argue, neither John
21 or I would argue very hard with the Board. I
22 mean, it is not our place to argue but even

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1 so, it is not impossible. It is not
2 necessarily inappropriate to assign doses from
3 the '53 to '56 time period, I agree, based on
4 the same information. The information is a
5 little more firm in the later period but there
6 is no reason to really believe that it should
7 have been different in the earlier period.

8 And even if say one person one
9 time did take that radium source, I don't
10 think that over a couple of days he would have
11 gotten in excess of say 12 rem. And that
12 would have been his only exposure because he
13 certainly was not a radiographer, regularly
14 exposed. So that was a single incident.

15 CHAIRMAN ZIEMER: Well actually if
16 you have an incident where a worker with a
17 claim says I took that source --

18 DR. MAURO: We could deal with it.

19 (Simultaneous speaking.)

20 MR. ALLEN: We actually did it at
21 GSI but I was trying to leave it open for --

22 CHAIRMAN ZIEMER: The bounding is

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1 not necessarily intended to cover incidents
2 that either are known or can be identified by
3 a worker.

4 DR. MAURO: Yes, I understand what
5 you are saying but I saw that as a breakdown
6 in controls.

7 CHAIRMAN ZIEMER: It is. And the
8 wandering through the workspace is also. And
9 the question was if that is sort of a regular
10 practice and not just a one-time thing and
11 some worker says you know I remember once
12 walking through that, and so add that to my
13 dose. But in a sense, we are adding it to
14 everybody's dose. We are assuming all the
15 workers wander through the radium sources.

16 MR. ALLEN: It is assumed that the
17 boundaries aren't respected.

18 CHAIRMAN ZIEMER: This bounding
19 that is being proposed is based on loose work
20 practices.

21 DR. MAURO: Yes, that's true.

22 CHAIRMAN ZIEMER: And that is one

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1 of the reasons that I personally am supportive
2 of the bounding. I think the full Board has
3 to weigh in on this.

4 You know, I am like you, John. I
5 think reasonable people can disagree on this
6 because we are working in an area where there
7 is not a whole lot of confirmatory data. But
8 unlike some other facilities, we do have good
9 source term data. We know that there are the
10 radium sources and we know there was the
11 betatron. And by the way, if there was an
12 iridium source actually being used, that would
13 be easy to bound that in because it is going
14 to behave. I mean, you would assume the same
15 loose work practices and you would, my guess
16 is if you did that, you wouldn't -- if you are
17 working with the radium, you are not working
18 with it, and vice-versa. So I am not even
19 sure. It would be an interesting thing to
20 look at. But in any event, I think you could
21 bound it also that way.

22 Now we don't necessarily have to

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1 close this right now but we sort of have to
2 know where we are on each of these.

3 I mean, I think -- I'm not sure
4 what closing means on the matrix. Does it
5 mean we all agree?

6 MR. ALLEN: Well I kind of
7 mentioned that the last time a couple weeks
8 ago. I think there are some where we have
9 reached, as John is saying, all the
10 information we have got and all the analysis
11 we are going to be able to do are out there.
12 And reasonable people can disagree. Whether
13 you call that closed or not, I think the fact-
14 finding might be closed.

15 CHAIRMAN ZIEMER: Well it sounds
16 like SC&A is cautiously agreeing that you can
17 bound or are you?

18 MR. ALLEN: Reasonable people
19 disagree.

20 DR. ANIGSTEIN: I think the
21 wording here is not simply to put '53 to '62.

22 It does not -- we would not disagree with the

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1 bounding approach even for that period.

2 CHAIRMAN ZIEMER: Well okay, let
3 me ask the Board Members. Do you wish to
4 close this item or pursue it any further? I
5 mean we can close it and not necessarily agree
6 on the final recommendation on this.

7 MEMBER MUNN: I don't know what
8 else one could do.

9 MEMBER BEACH: Well if there is no
10 other work to be done, I don't think we need
11 to leave it open.

12 DR. ANIGSTEIN: Right.

13 CHAIRMAN ZIEMER: Then we'll agree
14 to close it.

15 The next one, item two, incomplete
16 monitoring of workers. Of course some of
17 these are very related one to the other. I
18 mean, we have discussed the fact that we have
19 some film badge data that is useful for
20 certain things but we are largely relying on
21 the modeling for bounding. So the title line
22 here SC&A says we believe that using

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1 reasonable bounding claimant-favorable
2 assumptions and the latest calculational
3 tools, that it is possible to reconstruct
4 doses over the period January '64 to '66. And
5 this needs to be addressed by NIOSH in
6 revision of Appendix BB.

7 Again, let me ask the Work Group
8 Members what you believe.

9 MEMBER BEACH: I personally
10 believe these should stay open until we see
11 that that has been done. That is my personal
12 thought.

13 MR. ALLEN: Can I make a silly
14 suggestion on that?

15 CHAIRMAN ZIEMER: Yes.

16 MR. ALLEN: Would it be
17 appropriate to transfer that to the Appendix
18 Matrix or is that --

19 MEMBER BEACH: Oh, to the other --

20 MR. ALLEN: Yes.

21 DR. NETON: Dave makes a good
22 point that if it is not considered an SEC

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1 issue, it becomes a Site Profile issue and
2 then this is a matrix for the SEC evaluation.

3 And the Working Group feels that the issue
4 has been addressed as far as SEC is concerned.

5 DR. ANIGSTEIN: Yes, that was
6 already done with issue 10.

7 CHAIRMAN ZIEMER: Right.

8 DR. ANIGSTEIN: Which will be
9 transferred. It wasn't resolved. It was
10 addressed.

11 MEMBER MUNN: Recommend it be
12 transferred.

13 MEMBER BEACH: That's fine.

14 CHAIRMAN ZIEMER: Okay, we will
15 agree we are going to transfer this to
16 Appendix BB.

17 Now in essence, that takes it off
18 the SEC table at the moment. Now that doesn't
19 mean that later it couldn't -- that doesn't
20 preclude an SEC in the later years, depending
21 on how this comes out. But for the time being
22 it removes that later year.

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1 Lack of documentation, high-
2 importance one. It was of high importance.

3 MEMBER MUNN: Another transfer
4 issue.

5 CHAIRMAN ZIEMER: This is similar.
6 This has to do with the bounding in the post-
7 radium era. SC&A agrees with NIOSH that
8 bounding can be done and recommend moving this
9 to Appendix BB and closing.

10 MEMBER MUNN: Agree.

11 MEMBER BEACH: I agree.

12 CHAIRMAN ZIEMER: Okay. Close
13 this or move this to Appendix BB.

14 Issue 4 is the film badge
15 dosimetry dependence on photon energies and
16 exposure geometry. This had to do in part
17 with the AP exposure press back and so on.
18 There was a commitment from NIOSH that they
19 would revise their assumptions and repeat the
20 analysis but I think we had come to an
21 agreement on this. Did we not?

22 DR. MAURO: You said this might be

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1 in abeyance until I'm done?

2 DR. ANIGSTEIN: We have the
3 recommendation, my recommendation was that it
4 be closed.

5 DR. MAURO: That it be closed.
6 Oh, okay.

7 DR. ANIGSTEIN: Right.

8 DR. MAURO: All right. I told you
9 we are delayed until the Site Profile is
10 revised. I was thinking in Procedures
11 Subcommittee space.

12 DR. ANIGSTEIN: No, the conclusion
13 sentence is, "Whichever set of assumptions is
14 used, it is clear that the betatron operator
15 would not receive the bounding exposure and,
16 therefore, it can be closed."

17 DR. MAURO: Oh, okay. Sorry.

18 DR. ANIGSTEIN: The layout workers
19 --

20 CHAIRMAN ZIEMER: The layout
21 workers would have the higher values.

22 DR. MAURO: It preempts this. I'm

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1 sorry.

2 CHAIRMAN ZIEMER: Close?

3 MEMBER MUNN: Close.

4 MEMBER BEACH: Close.

5 CHAIRMAN ZIEMER: Close.

6 Issue 5, lack of validation of
7 models of radiation exposure of betatron
8 operators. This had to do with the use of
9 MCNPX and some of the things we went through
10 there. And then the modeling and use of the
11 normalization with the film badges, versus
12 just the modeling in part.

13 Bob says the discrepancy has now
14 been resolved but numerically we are not
15 seeing that quite yet because there is a
16 couple things still out there. One of them --
17 well, I guess we are going to get some
18 confirmation on the steel door issue. But the
19 other one --

20 DR. MAURO: The control badge --
21 are you still --

22 MR. ALLEN: Well I might be wrong.

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1 I was taking this one to be the kind of
2 calibration for the validation they did in the
3 beginning of that White Paper. That is based
4 on the 1971 survey and the 80-curie cobalt
5 source.

6 CHAIRMAN ZIEMER: Right.

7 MR. ALLEN: The lead shielding, et
8 cetera, the best we can tell were in place at
9 that point. So I think what you are talking
10 about is the shot scenarios put together for
11 the betatron itself, which come under the
12 other ones that we already discussed, I think.

13 CHAIRMAN ZIEMER: Oh, yes. Okay,
14 yes. This was just the calibration. I think
15 we have agreement on this one. Don't we?

16 DR. ANIGSTEIN: I'm sorry, on
17 which?

18 CHAIRMAN ZIEMER: This is number
19 five.

20 DR. ANIGSTEIN: Yes, we think that
21 we resolved -- there was a big discrepancy
22 between the film badges and the model. And we

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1 resolved it. We understand now why that was
2 the case. So we don't think there is any more
3 issue.

4 DR. MAURO: Well help me out a
5 little bit. There are a couple of matters
6 here and I might just be disoriented.

7 CHAIRMAN ZIEMER: This doesn't
8 have to do with the actual assigning of doses
9 to people. This has to do with, I think, with
10 the use of the 80-curie source, calibration.

11 DR. ANIGSTEIN: No.

12 CHAIRMAN ZIEMER: No?

13 DR. ANIGSTEIN: I mean, let me
14 give you a quick overview of this. Remember
15 this goes back to 2008 in time for starters.
16 October 2009 the matrix was done. So we have
17 come a long way since then with our
18 understanding.

19 At that time, there seemed to be
20 discrepancies. Now we understand reasons for
21 the discrepancy. We don't expect that the
22 limit that the film badges would actually

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1 represent the limiting doses that we calculate
2 in the model because the model predicts the
3 worst doses in the worst locations in the
4 worst time. So the fact that there was a
5 difference we now have a degree of comfort and
6 we understand why there is a difference and
7 why the model has already been modified.

8 One of the issues is that the main
9 source of exposure actually was that residual
10 radiation from the betatron and we have now
11 pretty much have a better understanding of
12 what it is, what it isn't. And so we just
13 don't think there's an issue.

14 CHAIRMAN ZIEMER: Okay, close?
15 Close.

16 Issue 6, underestimate of external
17 exposure of unmonitored workers.

18 MEMBER MUNN: Transfer to BB.

19 CHAIRMAN ZIEMER: Well, this is
20 the actual bounding part. Right?

21 DR. ANIGSTEIN: Yes.

22 CHAIRMAN ZIEMER: And it is the

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1 issue bounding in later years. And both SC&A
2 and NIOSH are agreeing that they can bound in
3 later years. We do still have some
4 differences. And so I think we want to see
5 what those look like.

6 I mean, we can transfer this to --

7 MR. ALLEN: Well that is why I
8 suggested transferring because then it
9 wouldn't be closed but it would be in the TBD.

10 CHAIRMAN ZIEMER: They would still
11 have to show that they -- and if you didn't,
12 this would reopen it for an SEC in the later
13 years.

14 DR. ANIGSTEIN: Yes.

15 DR. McKEEL: Dr. Ziemer, this is
16 Dan McKeel.

17 CHAIRMAN ZIEMER: Yes?

18 DR. McKEEL: I didn't hear you on
19 Issue 5. Did you close that or what was the
20 disposition?

21 CHAIRMAN ZIEMER: Issue 5, we
22 closed that.

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1 DR. McKEEL: Okay, thank you.

2 CHAIRMAN ZIEMER: Issue 6 would
3 transfer, we all agreed to transfer to
4 Appendix BB.

5 MEMBER MUNN: But Bob has
6 something to say.

7 CHAIRMAN ZIEMER: Yes, Bob?

8 DR. ANIGSTEIN: We have a burning
9 question.

10 CHAIRMAN ZIEMER: Yes.

11 DR. ANIGSTEIN: It is 2:45. Do
12 you think we are going to adjourn at 3:00?

13 CHAIRMAN ZIEMER: Yes.

14 DR. ANIGSTEIN: Okay.

15 CHAIRMAN ZIEMER: Issue 7, dose
16 reconstruction is not based on best available
17 science.

18 MEMBER BEACH: In progress.

19 MEMBER MUNN: Or Appendix BB.

20 CHAIRMAN ZIEMER: Let's see. Well
21 this was one where there was an actual error
22 in a table or something. You were using the

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1 wrong value for uranium surface dose rates or
2 something. So it was scientifically an error.

3 And they have agreed to correct it and the
4 correction will be in the new -- it is
5 strictly an error, an actual error.

6 MR. ALLEN: Math error.

7 CHAIRMAN ZIEMER: Isn't that
8 right?

9 DR. NETON: Well, it all had to do
10 with a new MCNPX.

11 CHAIRMAN ZIEMER: But now it has
12 gone beyond that?

13 DR. NETON: Kind of morphed into
14 this -- which version of MCNP to use.

15 CHAIRMAN ZIEMER: Okay, but
16 originally it was just an error that you were
17 going to correct.

18 DR. ANIGSTEIN: Now we found new
19 --

20 DR. NETON: But it is still the
21 similar issue which is using the best
22 available model in time.

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1 DR. ANIGSTEIN: I noticed that
2 Dave's latest calculation was using version
3 27E.

4 MEMBER BEACH: Which had some
5 errors, too, didn't it?

6 DR. ANIGSTEIN: Not really. The
7 latest one is 27. Oh, this is.

8 No, there is no problem.

9 CHAIRMAN ZIEMER: Okay, we are
10 going to transfer this one, also now, I
11 believe, to Appendix BB.

12 MEMBER MUNN: I guess I should
13 raise a process question here. We notice we
14 have indicated that it is in progress, which
15 is what we have done in the past when we
16 transfer things from one to the other. In
17 other venues, that is what we have done in the
18 past. What are we doing to do here?

19 CHAIRMAN ZIEMER: It is in
20 progress.

21 DR. NETON: It will be closed in
22 the SEC matrix. So it would transfer as in

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1 progress in BB.

2 CHAIRMAN ZIEMER: Right.

3 MEMBER MUNN: That is what we have
4 done in previous cases.

5 DR. NETON: That makes sense.

6 MEMBER MUNN: So we keep it alive
7 until it is done completely.

8 CHAIRMAN ZIEMER: Issue 8 had to
9 do with the model again, incomplete model use
10 for exposure assessment. A lot of these are
11 interrelated, I guess.

12 The latest one getting down to the
13 assumptions and how that affected neutron
14 dose. And I think both of you again have
15 agreed that you can model this and you are
16 kind of fine-tuning that model. Right?

17 MR. ALLEN: Yes.

18 CHAIRMAN ZIEMER: So this one
19 should also transfer.

20 MEMBER MUNN: Transfer to the
21 Appendix.

22 CHAIRMAN ZIEMER: I believe the

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1 underestimate of the beta dose is going to be
2 the same.

3 MEMBER MUNN: Yes.

4 CHAIRMAN ZIEMER: Transfer.

5 MEMBER BEACH: On this one you
6 questioned the use of 26E but you just said
7 they used version 27E.

8 DR. ANIGSTEIN: No, only for the
9 latest. Not for the betas.

10 MEMBER BEACH: Okay. With the
11 others, okay.

12 DR. ANIGSTEIN: We haven't
13 mentioned the beta. It is just a matter of
14 rerunning it.

15 CHAIRMAN ZIEMER: And number 10 we
16 have already done.

17 DR. ANIGSTEIN: Right.

18 CHAIRMAN ZIEMER: Now, I want to
19 go back and on Issue 1, I think we are at a
20 point where we can probably go forward to the
21 Board on the early years. The Work Group, I
22 mean, we have a 2-1 split but that's alright.

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1 What we would do would be to tell the Board
2 that -- all of this other modeling is later
3 year stuff. The rest of these items that we
4 transferred. But the early year section is
5 what it is. I don't think -- we have agreed
6 there is nothing more we can really do on that
7 and we can present that to the Board.

8 And I will work on a summary and I
9 will ask the Board -- you all know I try not
10 to bias these things. I try to be fair to
11 these minority reports.

12 MEMBER BEACH: I will get my say
13 is what you are saying.

14 CHAIRMAN ZIEMER: My report is a
15 minority report. The other two are women,
16 see.

17 (Laughter.)

18 CHAIRMAN ZIEMER: In any event, I
19 will try to summarize where we are on this at
20 the full Board meeting. And then we will --

21 MR. KATZ: And then you will make
22 a recommendation.

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1 CHAIRMAN ZIEMER: -- make a
2 recommendation.

3 Dan, are you still there?

4 DR. McKEEL: Yes, sir.

5 CHAIRMAN ZIEMER: I will want you
6 to be prepared also to make a case for the
7 early years, focus on that for the SEC.
8 Okay?

9 DR. McKEEL: Of course.

10 CHAIRMAN ZIEMER: I'm not trying
11 to talk you into it, Dan. We are going to I
12 think focus on the early years. They have a
13 process question.

14 DR. NETON: Yes, I just saw the
15 Working Group transfer all of the SEC issues
16 over to the Appendix BB Site Profile Issues.

17 CHAIRMAN ZIEMER: All except one.

18 DR. NETON: So I am a little bit
19 confused, except for number one.

20 And since they have been
21 transferred, I am wondering why -- does the
22 SEC Work Group continue to remain open to

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1 study them? Then I question why you
2 transferred them over the Appendix BB Work
3 Group because --

4 DR. ANIGSTEIN: It is the same
5 Work Group.

6 DR. NETON: Well there is a
7 fundamental difference here, though. If it is
8 a Work Group that is reviewing Site Profile
9 issues, that sort of implies that the
10 determination has been made that these are not
11 SEC issues.

12 MEMBER BEACH: That is still in
13 question also.

14 DR. NETON: Well I don't know why
15 it is. I mean, if we all agree that they are
16 Site Profile issues and they are tractable
17 problems, to use SC&A's language, why would we
18 leave these open? Otherwise you are going to
19 go to the Board and say we made a
20 recommendation for this first early period or
21 we are going to make a recommendation and then
22 these just stay open forever. We will just

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1 have to go back and rehash them as SEC issues
2 all over again.

3 At some point, the SEC Work Group
4 has to come to determination whether these are
5 tractable issues and are not SEC issues. To
6 leave them open indefinitely, it is going to
7 be very painful.

8 You can do what you want I suppose
9 but in other Work Group situations, it is
10 normally you sort of triage them. Are these
11 SEC issues or Site Profile issues and then you
12 decide to make a recommendation on the SEC
13 unless you feel it is expeditious just now to
14 move this first one forward and continue to
15 study these, in which case I think they need
16 to come back from the Work Group and stay on
17 the SEC Matrix as open.

18 CHAIRMAN ZIEMER: Well we could do
19 that with them. I think that the transferring
20 that we did was based on an agreement that
21 they were tractable.

22 DR. NETON: Right, which implies

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1 that they are Site Profile issues.

2 CHAIRMAN ZIEMER: Right.

3 DR. MAURO: In our position,
4 SC&A's position, all betatron issues are
5 tractable and it is just a matter of bringing
6 out details. Everything else with regard to
7 the radium, iridium, cobalt, we feel that the
8 only place where there is some subjective
9 judgment is that there is only '53 to '62, a
10 big time period.

11 SC&A's position is we believe that
12 they could be bounded and are tractable from
13 '57 or '56-'57 to '62. We feel that they may
14 not be tractable for various reasons. And
15 this is all we can give you from '53 to '57.

16 So the way we see it is the only
17 real SEC issues are can you reconstruct the
18 doses with sufficient accuracy from '53 to
19 '57. That is SC&A's position.

20 Now, but that may not very well be
21 our position.

22 MEMBER BEACH: Well that may not

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1 be the thought of the Board either.

2 DR. MAURO: That is not your
3 position. Exactly. Right.

4 MEMBER BEACH: But unless you
5 bring it to the Board and explain that -- we
6 can fill it all in. And I'm not so sure I
7 totally agree with that either.

8 MR. ALLEN: I guess my question
9 was you keep talking the early years. Are you
10 not going to make a recommendation on the
11 later years, then for this Board meeting?

12 MEMBER BEACH: At some point you
13 have to make a recommendation. The Board has
14 to --

15 DR. NETON: But we have
16 transferred them all to Site Profile issues.
17 That is why I am confused.

18 MR. ALLEN: That's what I thought
19 your question was.

20 DR. MAURO: And you are right.

21 MR. ALLEN: It seemed like there
22 was almost some agreement.

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1 CHAIRMAN ZIEMER: Well haven't we
2 done that on other SECs where we have left
3 open the study?

4 MR. KATZ: Well if you make the
5 judgment that they are tractable and they are
6 TBD issues, you have made the judgment with
7 respect to the petition as to where they stand
8 and you can make that recommendation to the
9 full Board.

10 CHAIRMAN ZIEMER: For the whole
11 thing.

12 MR. KATZ: Yes, for the whole
13 thing. That doesn't mean that you don't
14 follow up on the TBD issues as a Work Group.
15 And the Board of course will do what it will
16 do going forward on all of this. But you
17 might as well, if you have made the decision,
18 you all did just go through this process of
19 saying this is a tractable TBD issue. This is
20 a tractable TBD.

21 But in effect you made a decision
22 as a Work Group, you might as well recommend

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1 on the whole kit and caboodle to the Board and
2 then of course the Work Group can follow
3 through with TBD and the Board of course can
4 say go dig more on this or that if they want
5 to. But you might as well put the full plate
6 in front of them.

7 MEMBER BEACH: I agree with that.

8 DR. McKEEL: Dr. Ziemer, may I
9 make a final comment?

10 CHAIRMAN ZIEMER: Yes, you sure
11 can.

12 DR. McKEEL: Okay, well the final
13 comment of the co-petitioner is that I could
14 not be more disappointed by this decision nor
15 could I disagree more with the shunting of
16 many of these issues over as Appendix BB
17 issues, which I do not believe they are
18 exclusively.

19 The second thing I have got a
20 comment on that I am extremely disappointed
21 about is during the four-year course of the
22 deliberations of this Work Group we have lost

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1 two members. Mark Griffon, as I understand
2 it, resigned on his own volition. And Dr.
3 Poston has missed the last four meetings and
4 isn't even mentioned during roll call as
5 trying to attend the meetings.

6 So essentially what I feel is that
7 I have spent a large major fraction of my life
8 providing information and interacting with
9 this Work Group and trying to be an honest
10 broker between the Work Group and the workers
11 and site experts. And I really feel that the
12 two members who voted against an early SEC
13 have let us down.

14 I also want to say that I think it
15 needs to be said for the record that SC&A was
16 not definite about their recommendations.
17 They made a sort of piece of advice to the
18 Work Group that well, the 1953 to '57 data was
19 soft. And you know, but they would not
20 disagree with bounding the doses for that
21 period. Well that is essentially just
22 avoiding a recommendation altogether and I

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1 don't think that is their job.

2 I also want to say that despite
3 all of the protests to the contrary, I believe
4 that when this complete record is looked over,
5 and I certainly hope it will be, that many
6 people will find that SC&A did much of the
7 work that NIOSH was supposed to be responsible
8 for and that NIOSH was allowed an inordinate
9 amount of time to rework their models over,
10 and over, and over and in particular this last
11 period of time of 18 months with the Path
12 Forward.

13 And now essentially all of the SEC
14 issues magically have now been declared
15 Appendix BB issues. So not only will I
16 address the Board about the way I feel about
17 it, but I am going to be vigorous in my
18 defense. This was a very bad decision on the
19 part of the Work Group. I respect your right.

20 That is your right to do exactly as you see
21 but I think it is a cloudy decision. And
22 frankly, I welcome taking it to the full Board

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1 and making my case to them.

2 CHAIRMAN ZIEMER: And that's fine,
3 Dan. And I certainly will expect you to make
4 a vigorous defense and I will do the same for
5 the Work Group. And that's fine. We will
6 each try to make our case.

7 But we will let the larger Board
8 look at the issues and then hopefully they
9 will come to a conclusion or they may ask us
10 to do additional work. We will throw it in
11 their lap at that point.

12 But thank you again for your input
13 and John and Mr. Dutko and others. We are
14 going to adjourn at this time and then plan to
15 see you at the full Board meeting. Thank you.

16 (Whereupon, the above-entitled
17 matter went off the record at 3:00 p.m.)

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