

This transcript of the Advisory Board on Radiation and Worker Health, TBD 6000 Work Group, has been reviewed for concerns under the Privacy Act (5 U.S.C. § 552a) and personally identifiable information has been redacted as necessary. The transcript, however, has not been reviewed and certified by the Chair of the TBD 6000 Work Group for accuracy at this time. The reader should be cautioned that this transcript is for information only and is subject to change.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL 1
NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH

+ + + + +

ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

+ + + + +

WORK GROUP ON TBD-6000

+ + + + +

WEDNESDAY
NOVEMBER 2, 2011

+ + + + +

The Work Group convened in the Zurich Room of the Cincinnati Airport Marriott, 2395 Progress Drive, Hebron, Kentucky, at 9:00 a.m., Paul L. Ziemer, Chairman, presiding.

PRESENT:

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

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ALSO PRESENT:

2

TED KATZ, Designated Federal Official

DAVE ALLEN, DCAS

ROBERT ANIGSTEIN, SC&A

LEROY DELL*

JOHN DUTKO*

JENNY LIN, HHS*

GEORGE LUBER*

GREG MACIEVIC, DCAS*

JOHN MAURO, SC&A*

DAN McKEEL*

JAMES NETON, DCAS

JOHN RAMSPOTT*

*Participating via telephone

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

Report by Dr. Anigstein.....8³

Discussion of film badge data.....110

Topic: NIOSH will bound doses.....154
with sufficient accuracy in the early years

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1 P-R-O-C-E-E-D-I-N-G-S 4

2 (9:00 a.m.)

3 MR. KATZ: Good morning, everyone
4 in the room, and on the line. This is the
5 Advisory Board on Worker Health TBD-6000 Work
6 Group. We're going to be discussing GSI
7 today. Welcome everyone. Let me begin with
8 roll call with Board Members. And since we're
9 speaking about a specific site, please speak
10 the conflict of interest too for all the
11 agency related personnel.

12 (Roll call.)

13 All right, we have an agenda for
14 the meeting. It is posted on the NIOSH
15 website. I would just ask everyone on the
16 line, except when you're addressing the group,
17 please mute your phone. If you don't have a
18 mute button, if you press * and then 6,
19 that'll mute your phone then for this
20 conference line. Then to come off of mute,
21 you just press *, and then 6 again. Please,

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1 do not put the call on hold at any point. If₅
2 you need to leave for a bit, hang up and dial
3 back in. Thank you, and Dr. Ziemer it is your
4 agenda?

5 CHAIRMAN ZIEMER: Thank you, Ted.
6 I'll officially call the meeting to order. All
7 of you here in the room have copies of the
8 agenda. It has been posted on the website. I
9 believe it has been distributed also.

10 If you're on the phone and didn't
11 get the agenda, you can pull it up on the
12 NIOSH OCAS website. The -- I'll just take a
13 minute and review our agenda and schedule for
14 today. We're focusing primarily on, but not
15 exclusively on the early time period at GSI,
16 relative really to the petition itself, the
17 SEC petition. And by early, we're talking
18 about 1953 to perhaps '62 or '63.

19 Right now, I'm not making a sharp
20 division, although at some point, we would
21 need to. Then -- and that delineation relates

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1 mainly to the period prior to the AEC license
2 activity. So, that was part of our focus to
3 get a better feel for the radiation protection
4 program in the early years, but there are some
5 related issues that carry over into the AEC
6 period as well.

7 So, on the agenda, we're -- the
8 first issue that we're considering are those
9 questions that relate to the radiation safety
10 practices in the early years.

11 Then we'll be looking at some
12 specific things relating to film badges, and
13 the film badge data that we have really is
14 related at the moment to the AEC period,
15 although there may be some issues that we can
16 discuss about the presence of film badges
17 prior to the AEC licensing period.

18 Then we want to also consider the
19 overall question, if we're at that point
20 today, as to whether or not we believe the
21 NIOSH model can bound dose with sufficient

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1 accuracy for the early years. 7

2 We have a break scheduled at noon
3 for lunch, a one-hour break. We'll probably
4 take a brief comfort break mid-morning. We
5 are committed to adjourning no later than
6 3:00, and I will adjourn us at 3:00, whether
7 or not we finish this agenda because of other
8 commitments not only of the chair, but of
9 others in this room.

10 So, we will -- and actually
11 originally we didn't believe it would take
12 that long for this agenda in any event, but I
13 just wanted to let everyone know that we must
14 conclude by 3:00.

15 So, that's the agenda. We're going
16 to begin with the issue of questions regarding
17 what sources were used and what radiation
18 safety practices were used in the early years,
19 and we'll kick that off with a summary of the
20 SC&A interviews that were done recently.

21 Bob did those and prepared a

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1 report. I believe the Work Group Members have
2 the full report. There's a redacted version
3 that's available to the -- to the petitioner
4 and others, and I believe although it is
5 redacted, I suspect that most of the names of
6 the folks who worked at GSI probably know who
7 they are, but we cannot specifically name them
8 here ourselves today in this group.

9 So, I'm going to ask Bob to go
10 ahead and give his report, and then we'll have
11 a chance to ask questions and discuss that,
12 and then Board Members and petitioners as
13 well. Now, Bob?

14 DR. ANIGSTEIN: Thank you, Paul.
15 Okay, the first interview that we had
16 recently, and we had many before, was a former
17 radiographer, who was actually suggested by
18 the co-petitioner on the phone or the other --
19 can I name names, Ted?

20 MR. KATZ: What?

21 DR. ANIGSTEIN: Can I name people

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1 on the phone? 9

2 MR. KATZ: I mean people can name
3 themselves, but --

4 DR. ANIGSTEIN: No, I mean can I
5 name names --

6 CHAIRMAN ZIEMER: No. Just
7 suggested by one of the --

8 DR. ANIGSTEIN: Right. So, we --
9 he was interviewed, and to summarize his
10 interview, he had a weekday job that did not
11 involve any radiation exposure. This is
12 somebody going back into the '50s, and he
13 worked as a radiographer on weekends.

14 First he worked -- on and off, he
15 worked somewhere in 1953. He apparently did
16 the work. He worked for a while. He was laid
17 off. He came back. Then he came back
18 continuously employed starting some time in
19 '56 or after '56. So, '56 or '57 he started
20 permanent employment, and he performed
21 radiography only on weekends.

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1 So, his radiation exposures: during¹⁹
2 the week, he did not wear a film badge, and
3 his radiation exposures were just from the
4 weekend work. He said he worked whenever it
5 was available, anxious to get the overtime.

6 He estimated that it was 80 to 90
7 percent of the weekends that he worked, and he
8 worked one or two days per weekend.

9 Just parenthetically, I did some
10 research and I found that Illinois actually
11 has a law that requires one day off in seven.
12 Now, we could not find out when that law was
13 passed. The last I -- with revision of the
14 general statutes I think in the -- somewhere
15 in the 1970's, but that doesn't mean there
16 wasn't an earlier law. This is when they
17 revised their whole code.

18 So, whether that law was in effect
19 in the '50's, we don't know. And even if it
20 were in effect, with the current law, if the
21 worker volunteers to work, he can be exempted

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1 from it. But just as a point that seven days
2 a week seems a little much, but I could be
3 wrong.

4 At any rate, he -- and according to
5 his testimony, he always wore a film badge
6 during this radiography work. According to
7 this gentleman who I interviewed several
8 times, and he seemed to give a very
9 consistent, clear account of his work - he
10 seemed to have a clear memory - he said the
11 radium radiography -- we're talking about the
12 radium now, because this is the major issue,
13 was performed in this radiographic facility in
14 the number 6 building.

15 Initially, I for one was not aware.
16 I thought that this facility was built only
17 when they got the cobalt sources and applied
18 for the AEC license. But apparently, it had
19 been there all along.

20 At least according to this
21 radiographer, it was definitely there when he

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1 came back to work around '56. It may have¹²
2 been there earlier. He wasn't -- he wasn't
3 certain because he didn't work in that area.

4 He said the radium sources were
5 kept in a lead shielded cabinet in the middle
6 of the radiography room, and he did hear the
7 story. Now, this is a second hand account
8 that while he was away in the '54 to '56
9 period, he heard that someone had gotten into
10 the room and taken the radium source home.

11 But when he came back in 1956, the
12 door was locked and kept locked. So, he said
13 whenever -- whenever anyone had to leave, and
14 this is a sketch from the AEC licensing
15 document of the radiography room. There were
16 several drawings like this one, because it had
17 the right dimensions. There were other
18 drawings that had just distortion. The room
19 was 22 -- in the licensing text, it would be
20 corresponding. It was 22 by 60 feet, not
21 quite to scale.

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1 This was used later with the cobalt¹³
2 sources. So, when they applied for the cobalt
3 license or started using the cobalt source,
4 they put it in steel plates. That was an
5 addition. These weren't there when they were
6 doing the radium radiography.

7 The rest of the structure was
8 there. There was the operations room, which
9 also was an office, and it provided some
10 shielding, and the radium sources were kept in
11 the middle.

12 Talking to this gentleman later
13 when I called the -- I needed a follow up
14 call. Didn't go through the routine of
15 bringing in Dave Allen and the co-petitioner,
16 who was included in the first call. And he --
17 and I asked him about specifically was there
18 radiography done, radium radiography done,
19 outside this room. And he said very little.

20 He said he remembered once there
21 was railroad undercarriage. Backtrack said

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1 the way they would -- this room had no roof_f₄
2 So, they way they would get a casting into the
3 room, there was overhead cranes that traversed
4 the whole complex of buildings. Several
5 buildings. They're called separate buildings,
6 but they're really just columns separating
7 them.

8 They're separate roofs, but there
9 are really no walls between them. And so, the
10 cranes traverse from one end of the plant to
11 the other. At least a good portion of the
12 plant. And so, they would bring in a casting,
13 and they would simply deposit it wherever the
14 radiographer wanted it, as well as he could
15 communicate with the crane operator.

16 I'm just filling in my own
17 understanding of it -- some were in the middle
18 of the room. Now, the railroad undercarriage
19 may very well have been longer than this room,
20 or at least the available space in it.

21 So, in this instance, he said the

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1 source was taken by either wheelbarrow or - he¹⁵
2 wasn't sure - to either the number 9 building
3 or the number 10 building. Number 10 building
4 is the last building before you get to new
5 betatron building.

6 So, they go in order: 6, 7, 8, 9,
7 10. And he said that it was -- his phrase
8 was, "This is something that happened once in
9 a blue moon," meaning the source taken out of
10 the radiography room.

11 CHAIRMAN ZIEMER: Bob, what was his
12 -- how long did he work there? What was his -
13 -

14 DR. ANIGSTEIN: Well, as I said, he
15 --

16 CHAIRMAN ZIEMER: He worked into
17 the cobalt era?

18 DR. ANIGSTEIN: Yes. He --
19 according to the film badge data, he worked
20 there. And according to the film badge
21 records, he was there right through the

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1 covered period. 16

2 CHAIRMAN ZIEMER: Right. I just
3 wanted to clarify that.

4 DR. ANIGSTEIN: Yes.

5 CHAIRMAN ZIEMER: Because you're
6 talking initially about the radium, but --

7 DR. ANIGSTEIN: Right.

8 CHAIRMAN ZIEMER: But on the
9 presentation that you're showing us, you
10 indicate that the cobalt sources were removed
11 for this. Was that also true of the radium?

12 DR. ANIGSTEIN: Yes. He said he --

13 CHAIRMAN ZIEMER: Your slide says
14 it was the cobalt sources removed, but what
15 about the radium?

16 DR. ANIGSTEIN: No, no.

17 CHAIRMAN ZIEMER: See your last
18 bullet, "Cobalt sources were either" --

19 DR. ANIGSTEIN: No, that was a
20 second -- that was an additional comment.
21 First, I specifically -- the main reason we

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1 talked to him was because he was the only one¹⁷
2 at that time that I knew that had first-hand
3 experience with the radium.

4 CHAIRMAN ZIEMER: Right.

5 DR. ANIGSTEIN: So, he said the
6 radium -- his comment covered both.

7 CHAIRMAN ZIEMER: Okay. Just
8 wanted to clarify this includes the radium.

9 DR. ANIGSTEIN: Right.

10 CHAIRMAN ZIEMER: Thank you.

11 DR. ANIGSTEIN: No, this should've
12 been a separate bullet. The cobalt source,
13 that's a little confusing the way I wrote it.
14 Everything up here is about the radium. Then
15 just by the way, cobalt also.

16 CHAIRMAN ZIEMER: Got it.

17 DR. ANIGSTEIN: Okay?

18 CHAIRMAN ZIEMER: Yes.

19 DR. ANIGSTEIN: All right. So,
20 then we talked again. We had talked to both
21 of these gentlemen about a year ago, and

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1 included their initial interviews in ~~my~~¹⁸
2 reports at the time. So, this time -- at that
3 time, I spoke to them alone. This time we had
4 Dave Allen and the petitioner on the line.

5 And the second one was the -- he
6 describes -- for some reason, he describes
7 himself as an administrator. I think at one
8 point, he was at Saint Louis Testing
9 Laboratories. It's a family business. His
10 son is now the president.

11 They did the radiography. The --
12 they -primarily -- they use a -- they had a 10
13 curie cobalt source, which they used on a rail
14 spur on the GSI site. It was off to the -- I
15 don't have the plan with me. I have it at
16 home. It's a big area, and there are rail
17 tracks. I guess there's a spur on the side
18 for whatever purpose.

19 So, it's well away from the
20 buildings, and this is the area they chose,
21 understandably so as to not disrupt the

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1 operations and the normal traffic on the site,
2 And they also had a 50-curie iridium source,
3 which they used inside the plant.

4 The difference was the cobalt
5 source was used apparently for the initial
6 radiography, and then when they started
7 repairing the castings, they kept taking more
8 shots. "Well, let's see; did we get all the
9 defects?" They would grind out -- from my
10 understanding of this, it's as if they did a
11 lot of dental work. It's very much like
12 filling a cavity. They drill out the bad
13 part, and they fill it in with new material,
14 and that's exactly how they did the steel. And
15 there's X-rays just like a dentist uses.

16 So, then -- except they did it more
17 than once, and then they would use the --
18 they'd bring in the 50-curie iridium source.
19 Where they didn't want to bother taking the
20 casting out of the plants that were being
21 worked on, so wherever it was being worked on,

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1 they would put in that source and take the ²⁰
2 radiograph.

3 They eventually stopped using it
4 because it was too good. It showed more
5 defects than they wanted to see. So, they
6 went to using the betatron, which was not
7 quite as fussy, and they -- they had to
8 produce -- but they chipped off the casting.
9 They had to produce the film, saying, "Here,
10 we radiographed it, and it's good."

11 So, this cobalt radiation source
12 was used for a while. And then when they did
13 do that, it was very good practice. The same
14 practice you would use today. Went around
15 with a survey meter, and marked off the 2 mR
16 per hour boundary.

17 Now, most of these castings were
18 hollow shapes. Not always, but many of them.
19 And so, you didn't have to get that far away
20 to get down to the 2 mR per hour because the
21 steel itself would absorb the radiation,

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1 acting as a shield. 21

2 Nevertheless, they would do the
3 survey, mark it off as these yellow/magenta
4 rope things they use today, radiation warning
5 signs, and they kept it under constant
6 surveillance. I mean before I was skeptical
7 of it. I said, "Well, you guys got to take a
8 break."

9 The SLTL guy said, "No. If he had
10 to take a break, he basically turned off the
11 machine." Meaning in this case, he retracted
12 the source back into its shield, locked it so
13 it couldn't be removed and went and did his
14 business and came back.

15 And they -- he couldn't remember
16 exactly. He came in in late '64, and I used
17 that by the names he -- he wasn't quite sure.
18 By the names he mentioned and the fact that
19 they had just been working at the Saint Louis
20 Arch at the same time -- I looked up when that
21 was built. So, this seemed to be the best

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1 estimate. 22

2 He also performed -- because they
3 were required by the AEC license to have
4 periodic calibration of their survey meters.
5 So, before there was the Nuclear Consultants
6 Corporation that did that for them, and at
7 this point, Saint Louis Testing took over.

8 So, apparently, they took over all
9 the functions. Well, not all the functions,
10 but these functions. They didn't take over
11 radiation safety functions. They didn't
12 supply film badges, and they didn't -- they
13 weren't really -- they didn't perform any
14 radiation surveys, except of course when they
15 were on site themselves for their own
16 purposes.

17 When I asked him about was there
18 80-curie source, he said, "Well, no." He knew
19 of no large source for the whole time he was
20 there. He said there was a small source, what
21 he called a millicurie source, because he was

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1 once called in -- actually, they called him in ²³
2 and said, "Something is wrong with this meter.
3 It's not showing any reading."

4 The reason it wasn't showing any
5 reading is that it was saturated because they
6 had an exposed source that had come out. He
7 said it was one of the, what he called,
8 millicurie sources. Initially 260-280
9 millicurie sources. That was the only thing
10 he knew about.

11 Finally, we were talking to his
12 former GSI supervisor. We talked to -- the
13 third call, a former GSI supervisor, who also
14 confirmed that the radiographic facility in
15 number 6 building was there when he started
16 work.

17 At the time of his initial
18 interview, he could not tell me what year that
19 was. He did say that during radium
20 radiography, the area was roped off or taped
21 off, and posted with radiation danger signs.

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1 No one was allowed inside. 24

2 However, he was critical of the
3 management of the -- because he said unlike
4 the practice at St. Louis Testing, if the
5 radiographer -- according to this gentleman,
6 if the radiographer had to leave to get film
7 for the next exposure, the area was left
8 unmonitored.

9 He said that when necessary, the
10 cobalt-60 cameras were transported by overhead
11 crane to another location. And this is not
12 completely in conflict. The only difference
13 between this and the first radiographer that
14 we interviewed was how often this happened.

15 Neither of them -- he did not deny
16 that it happened. He just said it was not a
17 common practice. I was talking about the
18 first radiographer.

19 Asking and -- he also said, when I
20 asked him about other sources, then the small
21 cobalt -- then the radium initially, then the

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1 small cobalt sources, he said the iridium²⁵
2 source was used only by St. Louis Testing;
3 that they didn't have one.

4 He said he heard -- he heard
5 something about an 80-curie source, but he
6 does not remember it, and he heard it
7 presumably in recent years.

8 When I called him a second time, he
9 said he got his -- he said he started thinking
10 about when he started when other people were
11 there, and he says he thinks it was most
12 likely around 1955 that he started. So, he
13 was there just before the other gentleman had
14 returned to work and started doing
15 radiography.

16 He said he did not actually do
17 radium radiography, but he -- he helped. He
18 helped out. He did perform cobalt-60
19 radiography later.

20 Then finally, we did get a hold of
21 the former official of Nuclear Consultants

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1 Corporation, and we said that the radiation²⁶
2 safety was really a sideline. Their main
3 business was supplying radio isotopes for
4 medicine.

5 He said he did supply the film
6 badges because we have one report. It's
7 called -- it was called AEC Form 4, which was
8 discussed before here, which is a summary of
9 radiation exposure, which happened to be the
10 same as the first radiographer that I
11 interviewed in this current round. And it
12 said -- at the bottom of it, it said, "NCC."

13 So, it was prepared by the Nuclear
14 Consulting Corporation in -- in -- somewhere
15 around the spring of 1962. April, I think.
16 March-April. So, at the time, they were
17 apparently getting their act together while
18 they -- when they applied for the first AEC
19 license. And part of that was giving this --
20 what they should've been doing is giving this
21 man his radiation exposure record, going way

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1 back to the beginning of his employment. 27

2 This becomes important. So, it
3 said, "NCC," on it. So, that doesn't mean
4 they were supplying film badges all along. It
5 just means they went over the records, and
6 prepared a summary of his exposures. And then
7 they did later supply the film badges, and we
8 -- he said -- I said, "Where did you get your"
9 -- he said he got his film badges from
10 Landauer. He didn't say he made them himself.
11 He didn't have any dosimetry record, which
12 didn't surprise me.

13 When he -- I said said, "Were there
14 any other sources besides radium?" So, he
15 said, "There was no radium." By the time he
16 came, they discontinued using radium. He
17 didn't -- no mention of any other sources.

18 Frankly, it was very hard for me to
19 hear him. Voice was very, very faint. Even
20 though I had an amplifier on my telephone, I
21 couldn't keep telling him. And so -- but he

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1 did say something about they seemed to know²⁸
2 what they were doing. They seemed to have
3 their act together.

4 He said there were no incidents
5 leading to overdose that he can recall that he
6 would've seen the -- you know, he handled the
7 film badge directly. So, this is some of the
8 interviews.

9 So, new issues as to how this
10 affects the current picture. So, what we
11 learned was about film badge dosimetry use of
12 radium sources and then the possible
13 unlicensed sources, meaning that's a question
14 mark.

15 So, here is a photograph from the
16 magazine that was published by -- I think it
17 was a monthly magazine covered by GSI,
18 supplied to its workers. It was used for
19 public relations, which I'm sure was sent to
20 local officials -- and one of the gentlemen on
21 the phone now very kindly supplied me a copy

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1 of that magazine. 29

2 He saw a picture earlier, but I
3 wanted to -- I wanted to try to get the best
4 possible reproduction of it. The purpose of
5 this was the man was wearing a film badge, or
6 what appears to be a film badge.

7 First, I saw a picture of it but it
8 wasn't that clear, so I asked for the original
9 and it's pretty -- you can make a good
10 argument that that's a film badge. And if you
11 notice, it has the white open window. The
12 frame is wider on top than on the bottom,
13 unlike some of the badges where the window is
14 near the top.

15 And going on the ORAU website, they
16 have this museum maintained by somebody at
17 ORAU, and I just looked at everything, and it
18 looked very much like this one. Same shape.
19 Doesn't mean it was the same one, but it was
20 corresponding to the same time period.

21 So, then since the man who started

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1 doing radiography in '56 or '57 said he wore³₀
2 film badge, and here's a '53 picture, I think
3 we can pretty much say they had film badges.

4 They had film badges all along, which is new
5 information.

6 Because before that, I was
7 skeptical that they had film badges. I
8 thought maybe they only got film badges when
9 they got the AEC license, and it would be one
10 of the license requirements.

11 So now, then we did look. We tried
12 to find the Nuclear Consultants, and the --
13 actually, Jim first looked for it. Then he --
14 I asked him just if I could get this Landauer
15 -- NIOSH had paid Landauer to create an index,
16 and what they did was they started -- the
17 index only started in '61, and we found out
18 why.

19 We used to work Landauer --
20 associate talked to one of his colleagues, a
21 senior official at Landauer, and was told that

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1 before '61, they did not keep totals and they³¹
2 did not really identify the clients or their
3 records would not have been very useful for --
4 for future use, but it was starting in '61.

5 I mean they didn't identify names.
6 They didn't identify names and they didn't
7 accumulate totals. He didn't think there was
8 any point in indexing those years. It started
9 -- the company started in business in the mid-
10 '50s.

11 But starting with '61, and going
12 through '64, they did index them. I forget
13 how many thousand there were. There were
14 several thousand. I know because I actually
15 read them line by line just to be on the safe
16 side to see if there's anything that this
17 search -- the text search might not show up,
18 and even though in alphabetical order -- it
19 was in Excel files, we can sort it any way we
20 want.

21 Jim and I both agreed there's

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1 nothing. Nuclear Consultants isn't there,³²
2 Konnecker was the head of Nuclear Consultants.
3 His name doesn't show up. And we even said,
4 we speculated -- maybe there was another
5 middle man that he bought -- had an account
6 with Landauer, and he got his film badges
7 through still another party. And we couldn't
8 find any Landauer customer in the St. Louis
9 area, other than big corporations, government
10 agencies. Obviously would not have been a
11 supplier.

12 So, he must've just been mistaken.
13 I'm just thinking that. I also asked him, "Do
14 you have any idea who they got their film
15 badges from before you came on board in '62?"
16 And he said he assumed Landauer because
17 Landauer was the biggest supplier.

18 So, I think it's sort of like a
19 little word association game. I say, "film
20 badge." You say, "Landauer."

21 So, okay, knowing something now

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1 about the radiography practices: that they³
2 were mostly done inside that room, the
3 radiography room with a radium source, we just
4 ran an MCNP analysis, simple geometry, in two
5 locations.

6 One was in the middle of the office
7 because that's where the radiographer would
8 set up. They would put the source -- the
9 source was kept in the middle of the room in a
10 cabinet. So, they would have the casting
11 brought in, as he said, in the middle of the
12 room, as far away from the office as
13 practical. Didn't want to have it right next
14 to them.

15 They would drop position the radium
16 source, and scurry back to the office, and
17 wait there until the exposure was over. Most
18 of the shots were short.

19 So, here -- so, I asked -- so, we
20 did an analysis of this exposure position.
21 Then he said there was a door that was kept

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1 locked. No one was allowed in other than the ³⁴
2 radiographers. If they had to take a break,
3 or if they had to go and get more film, they
4 would simply leave and lock the door behind
5 them.

6 So, I did an exposure position
7 here. Some worker happened to be idly hanging
8 around, smoking a cigarette there, and what
9 his rate would be. And NCC, Konneker, who is
10 in the records, who had done the radiation
11 survey, he said of the -- not necessarily at
12 this point, but he actually went around with
13 the cobalt sources exposed; went around and
14 did a survey in the office and outside.

15 And he said, well, he would assume
16 a 25 percent occupancy; that nobody is going
17 to be there all the time, but that's likely it
18 would be 25 percent of the time as an upper
19 bound for the outside the room, the
20 radiographer.

21 So, we came up with three ways of

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1 assessing radiation exposures to radium. First³⁵
2 was the -- based on the MCNP analysis, the
3 radiation exposure in the office, assuming 30
4 percent because it was in the AEC licensing
5 applications as well, we do radiography at 30
6 percent of each shift, isotope radiography.

7 So, we said, "Okay." So, the
8 radiation exposure is 30 percent. The
9 occupancy was 100 percent during that time,
10 and here we have an exposure of -- assuming
11 this large number, 406, 30 to 50 work hours,
12 we get an exposure of 296 millirem for a year.
13 That was in the office.

14 Then, what would be his exposure,
15 the real exposure, would be while he was
16 handling the sources. He was carrying them,
17 dangling them at the end of the spring on a
18 fish pole, and I took the most conservative,
19 which is a distance of four feet. And we just
20 used the -- we didn't do the MCNP for this
21 one.

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1 We just used -- this doesn't
2 translate well for this one. This should be a
3 capital gamma, but this particular Acrobat
4 Reader doesn't produce it. It did on my home
5 computer. This is -- the factor for radium is
6 8.25 R square centimeter per hour per
7 millicurie. So, we take 500 millicuries at a
8 distance of this many centimeters -- 406.25,
9 and you will shift 30 seconds per exposure, 15
10 seconds to place the source, 15 seconds to
11 remove it and put it back in the shield.

12 Ten exposures per shift, and you
13 get 9.69 R per year. So, that would be added
14 to this relatively small 269 millirem. Again,
15 I apologize for this. It didn't -- the
16 trouble when you change computers. It looked
17 good on my own computer.

18 Then the final thing is for the
19 same gentleman, as I said, we have his
20 exposure records. So, we know he got about --
21 over a period of four-and-a-half years, so

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1 that's spread out and you get a good average,³⁷
2 The more years you have, the more meaningful
3 it is. So, you had a good average.

4 So, he got 2 rem a year. However,
5 he only worked weekends, and he got the 2 rem
6 a year during those weekends. So, we could
7 make two assumptions, two extreme assumptions.

8 One is he worked the minimum amount
9 of time. He worked only one shift, and he
10 worked, and it was 80 percent of the time. So,
11 that's the lowest that that's consistent with
12 his account. That translates, if you pro-rate
13 this then to a full-time radiographer working
14 406 shifts, that prorates to 20.5 rem per
15 year. That's the high end.

16 Then you take the low end. He
17 worked every Saturday and Sunday, 90 percent
18 of the time, except for two weeks off for
19 vacation. And that would translate to 9 rem a
20 year, which is remarkably close to this
21 amount, this model amount, when this -- yes,

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1 this 9.69. I'm sorry; I misstated. That³⁸
2 includes this already.

3 So, it's remarkably close to this
4 number. I surprise myself when you get real
5 life data that confirms your model. My guess
6 is that -- well, I'm not going to say what my
7 guess is. If -- I think the numbers speak for
8 themselves.

9 Then finally we have the statement
10 on the AEC application on how good the
11 Radiation Safety Program was before. They
12 didn't even talk about the program. They
13 talked about the training.

14 Now we have a formal training
15 program. We used to have a more informal
16 training program, but it was very successful
17 and we know that because nobody ever exceeded
18 the then applicable AEC limits. It was aware
19 that they changed, and most people only got 25
20 percent. The average was 25, but nobody
21 exceeded it.

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1 So, if nobody exceeded it, the ³⁹
2 limits were -- they changed some time in 1954.
3 So, let's say for the covered year, from '53
4 to '54, it would be 15 rem a year. Now,
5 starting in -- I'm sorry, there's an error on
6 my part. Not sure how I got this. It
7 should've been 12 and not 12.5.

8 Because starting with '55, they
9 were allowed to get 3 rem quarter, and then 18
10 -- no, n - 18 rule. Now you get somebody who
11 is, let's say, 30 years -- 40 years old and
12 not done previous radiography and radiation
13 exposure. So, he's got a credit -- let's say
14 he's 38 years old and make it real simple.

15 So, he's already got 100 rem in the
16 bank that he can draw on. So, he could
17 continue getting 12 rem a year, and then you
18 subtract -- then for every year, you subtract
19 5 or 7 from that 100.

20 So, you could continue getting 12
21 rem a year for quite a while before he exceeds

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1 the lifetime limit. 40

2 CHAIRMAN ZIEMER: That's correct.

3 DR. ANIGSTEIN: So, therefore, as a
4 practical limit, you could -- people could be
5 getting 12 rem a year after '55. And that
6 falls very neatly into this range of 9 to 20,
7 and falls very close to the modeled exposure
8 of about 9.69.

9 So, I would say if we needed to
10 have a plausible upper bound, and initially, I
11 was -- when we saw those -- you know we had
12 those FOIA records, AEC records, back in 2000.

13 We started looking at them over a year ago.

14 I was skeptical. I was saying,
15 "Well, that's an easy thing to say, 'we never
16 exceeded the AEC record.' But where's the
17 proof?" Apparently, they had these records,
18 and the AEC are not going to make a false
19 statement. But the AEC can say, "Well, let me
20 inspect your film badge records."

21 So, it seems like this would be a

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1 truthful -- they didn't make an extravagant⁴¹
2 claim where nobody got more than 10 millirem a
3 week, or some nonsense like that. But this
4 seems believable, and this seems to be a
5 plausible upper bound for those years.

6 Now, we'll get -- I think the
7 question will be answered a little later.
8 Finally -- by the other sealed sources. So,
9 the iridium-192 is not listed by AEC.

10 Now, we just saw this License
11 Amendment number 8, and we saw a little part
12 of it that was forwarded by the petitioner.
13 And that is well after the covered period. I
14 haven't been able to find number 8, but I
15 found number 7. I remember seeing number 7,
16 and number 7 was already well into the late
17 '60s and the early '70s.

18 So, this one -- I think this one
19 was 1972. So, they may have had license to
20 use iridium later, but that has nothing to do
21 with the activities during the covered period.

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1 So, during the early years, it was⁴²
2 not listed on the AEC license. The GSI
3 supervisor, whom I specifically called back
4 and asked, and he said no. He said St. Louis
5 testing had the iridium source. GSI did not
6 have one.

7 Another I looked up later because
8 of still another supervisor who is now
9 deceased, recently deceased. I specifically
10 asked him during this meeting I had with the
11 workers in Collinsville in 2007 about the
12 iridium source, and he said the same thing. He
13 said iridium was owned by St. Louis Testing,
14 and GSI never had an iridium source.

15 So, it would be unlikely they would
16 have an unlicensed source because this is '74.

17 They have -- every few months has to be sent
18 back, and re-irradiated at the reactor. And
19 again, it' implausible to have had one.

20 So, then finally the question of
21 the large -- was there a large cobalt-60

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1 source? Now, number one, it's not listed on ⁴³
2 the AEC license until 1968. Again, the
3 supervisor said he had no recollection of this
4 source. The other -- now I -- the other
5 supervisor, the betatron supervisor, passed
6 away about a year ago. He said he does not
7 believe they ever had such a source.

8 However, he left the company in
9 1966. So, he said he was definitely involved
10 in the non-destructive testing department
11 until late '64, but later on he was in the
12 department that would've handled the -- he
13 would've regularly met with the people in the
14 testing department, and he said they would
15 have known about it. And also, the official
16 from St. Louis Testing said he knew of no
17 large such source.

18 Now, the final thing he tracked
19 down, and I'm just reiterating this as before,
20 was we went back to the NRC and said, "What
21 about Pennsylvania?" The General Steel, it

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1 was then called General Steel Castings, have⁴
2 any records from the Eddystone facility, which
3 is the only other big casting -- it's like the
4 sister plant to the Granite City plant.

5 And finally, what came out was
6 while there was nothing -- there was nothing
7 at Eddystone, but there was in Avonmore which
8 is a former National Roll and Foundry company,
9 which was acquired by General Steel Castings.
10 They had a 10 curie source, but they got rid
11 of it in 1959. In addition 10 curies assayed
12 in something in '57.

13 They did say at one point, and it
14 was a little suspicious, because at one point
15 they say, "Well, we're not going to use it."
16 But they had all kinds of deficiencies. "You
17 didn't do this right. You didn't do that to
18 earn the license." And their response was,
19 "We're not going to bother responding because
20 we're -- we've mothballed the source, we're
21 going to be discontinuing the use of it, and

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1 we're going to perhaps sell it to another GSI₄₅
2 facility," or General Steel Castings facility.

3 So, they said, "Oh, maybe they sold
4 this through Granite City?" But it doesn't
5 make any sense. But then the final
6 disposition was assigned, saying it was
7 disposed of according to 10 CFR 20. No
8 details of how it -- of -- no other detail,
9 but it was a signed statement.

10 So, this obviously would not have
11 been in accordance with 10 CFR 20 if it passed
12 it onto a facility with no license for it. But
13 even if saying, "Okay, so, maybe they were a
14 little sloppy and careless, or naive." And
15 that would have -- then you would've said,
16 "They would've gotten this source in 1959. Why
17 would they suddenly go, in 1962, and say, 'We
18 urgently need a license for 300 millicurie
19 source because Illinois won't allow us to use
20 radium,' if they already had a much bigger
21 source all along?"

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1 So, that's implausible. And how⁴⁶
2 would -- and the State of Illinois, which knew
3 about the radium sources and disapproved of
4 their use, they would've had to pull the wool
5 over their eyes. There's just too many
6 implausibilities there.

7 So, finally, the explanation is why
8 would some worker have thought that they had a
9 large source? And I was surprised to find,
10 looking over close to a thousand pages of
11 literature, many of them are redundant. But
12 anyway, repeat copies of the same thing. Even
13 though they ordered 300 millicurie sources,
14 and getting a 260 and a 280, the camera was
15 good for a 10 curie source.

16 Why? Maybe that's what they
17 happened to have available, or maybe they
18 thought in the future they might want to use
19 more powerful sources. So, this is a very
20 hefty unit. It would weigh anything between
21 400 and 750 pounds.

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1 It was also the -- the -- let me
2 just go back very quickly to this sketch.
3 Okay, this sketch shows the sources. So,
4 clearly, these look like two wheels. If you
5 don't know what they are, maybe you don't
6 know. But now we know they're on wheels, they
7 clearly look like two big shields between two
8 wheels.

9 In fact, here is the Radionics
10 source. This is the one that was licensed in
11 1968, and this is the only one we've been able
12 to get a photograph of. And here it is,
13 sitting on two wheels, very much like that
14 little crude sketch of something sitting on
15 two wheels.

16 And here, they have different --
17 so, you can have a -- if you can read that. Is
18 that big enough to read?

19 MEMBER BEACH: It's in the report.

20 CHAIRMAN ZIEMER: We have a copy of
21 it.

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1 DR. ANIGSTEIN: Okay. I can make⁴⁸
2 it bigger. I'm just using -- so, here we go.
3 I like it full screen. Okay, should be
4 better. So, a 10 curie source, I mean a
5 shield for a 10 curie source, already weighs
6 750 pounds. They called it shipping weight,
7 but that really includes the wheel, the
8 assembly. Basically, the shipping weight is
9 the weight because it includes the wheels and
10 the assembly.

11 The shield itself is 600 pounds,
12 whereas the 100 curie, and that's the one they
13 got. Even though they got 80 curies, the
14 model number is -- they go by is a 60-100. So,
15 its capacity is 100.

16 And so, that one weighs 1,300
17 pounds. Okay, it is obviously bigger than 750
18 pounds. But both of them are pretty damn big.
19 So, it could easily be that someone who is not
20 actually doing the radiography and therefore
21 doesn't have to sit down and calculate, "Okay,

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1 I've got so many curies, and this is so much⁴⁹
2 thickness of steel. So, I need so many
3 minutes or hours to do the exposure."

4 But someone who is helping with the
5 radiography doesn't have to know that. He is
6 helping setting up the shots, and it looks
7 like a pretty big source, even though it's a
8 small, little, puny source inside. So, that's
9 basically -- and then now I'm going onto the
10 next topic. So, I'll go back to that later.

11 CHAIRMAN ZIEMER: Okay, thank you,
12 Bob. Let me ask the Work Group Members if you
13 have any questions on this issue. Well, on
14 any of the worker interviews or on the
15 information Bob has provided here.

16 MR. DELL: I have a statement.

17 CHAIRMAN ZIEMER: Hang on. We're
18 asking the Board Members here first. Okay,
19 Wanda, did you have a question on that?

20 MEMBER MUNN: No, but I did want to
21 thank Bob for the illustrative material that

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1 he provided. It was very helpful for me to
2 get a better idea of the overall concept of
3 where these problems originally may have --
4 where the questions may have come from.

5 CHAIRMAN ZIEMER: So, Bob, SC&A now
6 is of the position that there was a film badge
7 program.

8 DR. ANIGSTEIN: Yes.

9 CHAIRMAN ZIEMER: Although we don't
10 have the records, that there apparently was a
11 film badge program?

12 DR. ANIGSTEIN: Right. We have
13 record of one worker.

14 CHAIRMAN ZIEMER: Right.

15 DR. ANIGSTEIN: And we have the
16 statement about not exceeding the limits.

17 DR. ANIGSTEIN: Right.

18 CHAIRMAN ZIEMER: And also the
19 general usage in that room, but occasional
20 usage outside. What about the issue we talked
21 about before of the possibility of people

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1 traversing the area where a radium source⁵¹
2 might've been roped off?

3 DR. ANIGSTEIN: Yes.

4 CHAIRMAN ZIEMER: I didn't really
5 address that here, but is that still a
6 possibility?

7 DR. ANIGSTEIN: Yes, but the
8 analysis that I showed at that last meeting is
9 for each such intrusion, you get on the order
10 of a millirem.

11 CHAIRMAN ZIEMER: Yes, it's fairly
12 low, number one. And number two --

13 DR. ANIGSTEIN: I mean I did a
14 detailed calculation for the 10 curie source
15 before we realized that it was really
16 enforced, and there if you assume that
17 somebody didn't necessarily walk straight past
18 the room, they decided, "Here's a short cut.
19 I'm going to take a short cut in some random
20 direction."

21 On average, per intrusion, you got

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1 on the order of a millirem. 52

2 CHAIRMAN ZIEMER: Right. But the
3 other thing was I think in the previous
4 scenario, we assume that every shot had that
5 possibility --

6 DR. ANIGSTEIN: Yes.

7 CHAIRMAN ZIEMER: -- whereas, if
8 like 90 percent or more were in the enclosed
9 room, then that changes that scenario a great
10 deal.

11 DR. ANIGSTEIN: It does, but I
12 think that it's a non-issue.

13 CHAIRMAN ZIEMER: It's still a
14 trivial amount.

15 DR. ANIGSTEIN: Yes, right.

16 CHAIRMAN ZIEMER: But in terms of
17 conceptually --

18 DR. ANIGSTEIN: Right. Particularly
19 if we assign a dose of 2 rem just from
20 standing outside that door on a 25 percent
21 basis, this other scenario is not going to

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1 change. Because obviously, you can't do 53
2 you can't have simultaneously exposures inside
3 the room, and outside the room.

4 CHAIRMAN ZIEMER: Right.

5 DR. ANIGSTEIN: So, well, I guess
6 you could if you -- and that was assuming, by
7 the way, the analysis of the radiography room
8 assumed that both radium sources were exposed.
9 So, we had a total of 1 curie.

10 CHAIRMAN ZIEMER: Right, okay. I
11 wanted to ask Dave or Jim as far as NIOSH is
12 concerned, do you have any either questions or
13 issues with the analysis that we've heard from
14 SC&A on this?

15 MR. ALLEN: No. Definitely no
16 questions. The analysis Bob did in this
17 latest thing had several possibilities in
18 there.

19 CHAIRMAN ZIEMER: Right. The
20 bounding numbers could be a little different
21 depending on the four foot versus six foot.

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1 But in terms of sort of -- okay, I want to ask⁵⁴
2 the petitioner now if there are questions or
3 comments that he or his colleagues wish to
4 make.

5 DR. MCKEEL: Dr. Ziemer, this is
6 Dan McKeel. Can you hear me?

7 CHAIRMAN ZIEMER: I can, Dan.

8 DR. MCKEEL: Okay, good. Yes, I
9 have actually a number of comments. I guess I
10 sort of have to start and go through them.

11 CHAIRMAN ZIEMER: Sure.

12 DR. MCKEEL: The first thing that
13 I'd like to say is there was information
14 presented this morning by SC&A, Dr. Anigstein,
15 that I don't believe is in the report that we
16 are -- at least I received on October the 31st.

17 And particularly, the information about the
18 interview with Dr. Wilfred Konneker.

19 Our agreement last meeting was that
20 I would be allowed to be a silent observer to
21 those interviews, and I have written to you,

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1 Dr. Ziemer, several times, asking what is the ⁵⁵
2 status with that interview.

3 Ted Katz has written back and said
4 that he thought Dr. Anigstein had made contact
5 with Dr. Konneker, and that Dr. Anigstein had
6 decided not to conduct a group interview
7 because Dr. Konneker was not well.

8 Interestingly, that wasn't
9 mentioned this morning. What was mentioned
10 was that Dr. Konneker was sort of quiet on the
11 phone. Well, you know, he's an elderly
12 gentleman, and so he may be quiet. There are
13 other people who are in this Work Group who
14 are hard to hear from time to time. So, I
15 understand that.

16 But the point I am distressed
17 about, to say the very least, is we had a
18 bargain. Dr. Anigstein relayed a lot of
19 information that he attributes to Dr. Konneker
20 by way of his own personal interview, to which
21 Dave Allen and myself were not privy.

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1 And I simply need to say that our⁵⁶
2 bargain in that situation, as far as I'm
3 concerned, was broken.

4 The other comment I have, or that I
5 did listen to three of the first interviews,
6 the ones described as 1, 2 and 3, and all I
7 can say is that there are discrepancies
8 between what I heard during the interview and
9 what was said this morning and reported, and
10 what's written in the review paper received
11 October 31st.

12 Now, one other gentleman that was
13 interviewed is on the phone, and wants to make
14 a statement, and I hope he will do that after
15 I finish. But I want to skip over to him, and
16 say the following.

17 During that interview, and in
18 interviews that we've had with the same
19 gentleman, and by we I mean John Ramspott had
20 had, and relayed to me, it was very clear that
21 this gentleman's main concern was with safety

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1 issues at GSI. 57

2 And his testimony to us was that
3 the small source, cobalt-60, was used
4 extensively outside of the small radiography
5 building in Building 6, and that his main
6 concern was that many of those sessions, not
7 once in a blue moon or things like that, were
8 unattended. And that in fact he relays the
9 story when he first came there in the first
10 shot, that they set it up and both the primary
11 radiographer and himself left the scene and
12 went back to do their jobs.

13 So, that's a very substantial
14 thing. Then I want to -- then I want to go
15 back to what I feel is -- I don't know of a
16 polite word to say this, but there's a lot of
17 indication that GSI had owned and used an
18 iridium-192 source that was different from the
19 one by St. Louis Testing.

20 And in this recitation that we just
21 heard from Dr. Anigstein, during which I made

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1 notes, I note that he carefully left out the ⁵⁸
2 testimony, which I had sent to you all to the
3 Work Group, and to SC&A and to NIOSH, from at
4 least three former workers, including people
5 that had been mentioned this morning.

6 One was an interview that Dr.
7 Ziemer conducted with a former radiation
8 safety officer at GSI back in November, and
9 there was more correspondence and a
10 reinterview in November and December, and
11 another report in February of these
12 interviews.

13 The final report was in a report
14 that SC&A prepared, and in the December 10th
15 interview, which this gentleman was nice
16 enough to share directly with us, and so we
17 didn't need to depend on just what's written
18 down, I have it in front of me.

19 It's titled, "Draft Advisory Board
20 on Radiation and Worker Health. Summary of a
21 former General Steel Industries Worker

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1 Conducted by Paul L. Ziemer." Report Date is
2 December 10th, 2009. On page 2 -- on page 1,
3 there's a section called, "Information
4 provided by ' identifying information
5 redacted'." And there's a section in there
6 that cobalt-60 sources, and Mr. Wheeler there
7 says it's hollow.

8 The source was always referred to
9 as an 80 curie source. He was unsure of any
10 independent documentation or certification of
11 that amount, but stated that it was always
12 identified and referred to by that
13 nomenclature.

14 Then on page 2 -- so, also
15 carefully left out this morning, and I thought
16 not explained, that the cobalt -- the large
17 source of cobalt-60, the 80 curie source, was
18 that at least five workers had given
19 affidavits that they used that source during
20 1963, 4 and 5.

21 One of those workers that signed

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1 that 2008 affidavit, and I'm going to mention
2 his name because all of these men have given
3 me permission to do so, and I'm going to put
4 it on the record, even though it'll be
5 redacted, his name is George Luber, L-U-B-E-R.

6 He's -- George has spoken directly
7 to the Advisory Board several times. George
8 was one of the people who signed that 2008
9 affidavit, and Mr. Dutko reinterviewed George
10 recently, and George reconfirmed what he had
11 said before: that the large cobalt source he
12 was talking about was easily distinguished
13 from the small cobalt-60 sources by its size
14 and weight.

15 Now, it is true, as Dr. Anigstein
16 pointed out, that even the quote small source,
17 that is small in curies compared to the large
18 source, was contained in a heavy housing, a
19 Unitron model 110A, or model 110B, depending
20 on the period of the time that is reported in
21 the AEC license material.

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1 George Luber said that it was quite
2 easy to distinguish the two types of cobalt
3 sources based on their size and their weight.

4 So, the big source had larger wheels, and it
5 weighed a lot more. It was harder to push
6 around.

7 And what's most telling about that
8 is the photograph that Dr. Anigstein reports
9 and shows of the radionic model that was --
10 housed the large source is exactly what the
11 men described as being the large source. That
12 is a spherical container.

13 Now, on the other hand, the small
14 source was described by at least one person as
15 having a funnel shaped container. Now, I
16 heard that; I thought, "Gee, that's an odd
17 shape for a container." But anyway, that's
18 what was on -- put on record. I believe it
19 was either in the October 2010 meeting, or the
20 September 20th meeting of this year.

21 But in any case, at the September

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1 20th meeting, a GSI worker was on the phone, ⁶²
2 and he mentioned that he had some material
3 that he wanted to give to John Ramspott, and
4 Dr. Anigstein -- someone had said, "Well, Bob
5 Anigstein, are you going to get a copy of
6 that?" And Bob says, "Oh, I'm sure that John
7 Ramspott will send me those like he always
8 does."

9 So, that was on the record that
10 there was a material that was important that
11 should have wound up in Dr. Anigstein's
12 possession. And anyway, what that material
13 was was a brochure about the Unitron Model
14 110AB, and it showed a very nice picture of a
15 Unitron Model 110AB.

16 Now, this was a brochure from 1972,
17 and what it showed was an all stainless steel
18 cart and container. It was quite striking.
19 And my comment, when I first saw it was,
20 "Well, gee whiz. Let's show that to the men
21 because if you were wheeling around a

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1 beautiful bright, shiny cart like that⁶³
2 anybody, particularly a steel worker, would
3 remember that particular fact about the
4 machine."

5 It is interesting to note that in
6 the earlier license applications from GSI to
7 the AEC, where Nuclear Consulting Corporation
8 is referred to as the manufacturer actually of
9 the small source, what's mentioned there is a
10 Unitron model 110A -- no, B, which might be, I
11 would think, an earlier model.

12 So, it is certainly possible that
13 earlier in the course, Unitron offered a non-
14 stainless steel model, and that's what the men
15 might've seen. But what was striking about
16 the picture of the Model 110AB was the funnel-
17 shaped container for the source.

18 To me, it looked like a funnel
19 turned on its side. That's the way I --
20 because if you just laid it on its side on the
21 ground so the small end was pointing to the

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1 left, as I remember, and the -- as you looked⁶⁴
2 at it from the front, and the large end was
3 pointing to the right if you looked at it from
4 the front.

5 So, anyway, it was my understanding
6 that that was the whole point of what we were
7 getting at at the September 20th meeting that
8 we were going to assemble pictures of both
9 units, the small and the large cobalt-60
10 sources, and then they were going to be shown
11 to the workers, and let the workers say, "Oh,
12 yes. This is the one I saw the large source,"
13 and so forth.

14 So, that hadn't been done. And in
15 fact Dr. Anigstein reports that he doesn't
16 have a picture of the Unitron Model 110AB.
17 Well, I would say that all he had to do was to
18 call either the person that spoke up on the
19 phone, or call Mr. Ramspott, whom he knows
20 very well, to get that picture.

21 Now I want to come back to the

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1 iridium-192, and I digress because in the same⁶⁵
2 interview that Dr. Ziemer, I was just
3 describing what was on page 1. But on page 2,
4 there's another paragraph called, "Iridium
5 192." And the iridium is spelled I-R-R-I-D-I-
6 U-M 192. And it says -- there are two points.
7 Point 1 says, "Mr. Wheeler stated that the
8 iridium-192 source was nominally identified as
9 initially being a 0.25 curie, in parenthesis,
10 250 millicurie, end parenthesis, source."

11 He further identified it as an old
12 source that had gone through a large number of
13 half lives, so that he believed the activity
14 could be much lower than 0.25 curies when he
15 was using it. And then point two says the
16 iridium source was only used to radiograph
17 items in a separate small building, whose
18 number he could not recall. He indicated that
19 the area was not roped off for these
20 exposures.

21 Then on the copy I have of the

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1 draft, which was sent to me by Mr. Dutko, who
2 obtained it directly from this gentleman, the
3 part of 1.1, which says, "Mr. Wheeler stated
4 that the iridium-192 source," the iridium-192
5 is crossed out, and there is 0.25, and there
6 are five letters that look to me like they are
7 C-U-B-U-L, but they could be C-O-B-O-L, Cobol
8 60. And that zero is also a U. So, maybe
9 some have that deleted.

10 So, when I saw that, I said, "Well,
11 this was an early draft, and the point is that
12 in the final versions that emerged of this
13 interview, that iridium-192 paragraph was
14 completely gone, eliminated. It disappeared.

15 So, my thought was, "Well, maybe" -
16 - which I don't have the response that Mr. --
17 why don't we call him Mr. W? So, Terry Dutko
18 called Mr. W back, and said, "Do you remember
19 if you crossed off the iridium-192? Did you
20 mean to do that and to substitute 0.25 cobalt-
21 60?"

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1 And Mr. Wheeler said no. He didn't⁶⁷
2 do that, and he didn't intend to do that. So,
3 I don't know what to say about -- further
4 about Mr. W, except that Dr. Ziemer talked to
5 him, and I assume that Paul must've heard
6 iridium-192, and must've written it down in
7 his draft report. I don't believe that can be
8 a typo of cobalt-60.

9 The second thing is about one of
10 the supervisors who is deceased. And since
11 deceased people are not covered by the Privacy
12 Act of 1974, I'm talking about ' identifying
13 information redacted', ' identifying
14 information redacted'.

15 I sent you all an email that Mr.
16 Burgess sent to John Ramspott in 2006, and in
17 that email, Mr. Burgess -- this was before all
18 this controversy about whether there was an
19 iridium-192 source or not. But Jim confirmed
20 that there was in fact a GSI 192 iridium
21 source, and you all have that material.

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1 Now, I don't know why that wasn't
2 brought up by Dr. Anigstein. I don't know
3 whether, to be honest with you, the Work Group
4 shares things with SC&A, but obviously they
5 should be doing that all along. They should
6 be doing that all along.

7 The third thing is there is another
8 gentleman who is alive, and has been
9 interviewed, and Dr. Anigstein -- I'll call
10 him Mr. P. Mr. P was the radiographer who was
11 at GSI in 1956, confirmed that the small
12 building used for radiography in Building 6
13 was there when he came.

14 That gentleman confirmed that there
15 was a GSI iridium-192 source on several
16 occasions. So, not only is there the 2008
17 affidavit signed by five radiographers, but
18 some of those same gentlemen had before and
19 after that 2008 affidavit had indicated
20 independently that there was an iridium-192
21 source.

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1 So, I want to say this morning that⁶⁹
2 I do not believe that it -- the iridium-192
3 source should've been written off. I don't
4 believe the evidence against it being there is
5 persuasive. I think that NIOSH should have
6 calculated a bounding dose for it, and they've
7 not done so.

8 So, that brings me to the final
9 point that I want to make. And to me, this is
10 huge and overriding. We've brought it up
11 before. We've talked about it, and I just
12 heard another great example of it this
13 morning.

14 Dr. Ziemer has said over and over
15 that SC&A is not supposed to be doing NIOSH's
16 work. And we're going to hear two examples
17 today of places where, as far as I'm
18 concerned, SC&A clearly was doing NIOSH's
19 work.

20 It is NIOSH's job, NIOSH's job, to
21 investigate the portable sources at GSI. It

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1 is NIOSH's job to calculate a bounding dose⁷⁰
2 And here, what we have heard, in my opinion,
3 it is also NIOSH's job to interview people.

4 I can attest to you that during
5 these interviews, the three that I heard, Mr.
6 Allen asked one question that I'm aware of.
7 Just one, and the rest of the interview was
8 conducted by Dr. Anigstein.

9 But in what you heard this morning
10 about the modeling for the radium sources, you
11 didn't hear anything from NIOSH. And when
12 NIOSH was given a chance to respond or make
13 comments, there weren't any. But what you did
14 hear was that -- that SC&A, on its own,
15 undertook an independent study to create a
16 bounding dose for radium-226 at GSI.

17 I don't even think -- I hope we
18 don't take up their valuable time even trying
19 to address this today. I just think it's an
20 egregious error. If this were trial, I'd make
21 a motion to strike that entire testimony from

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1 the record. And I don't think it is valid.⁷I
2 think that we need a model or a bounding dose
3 calculated by NIOSH using NIOSH methods, and
4 done by NIOSH personnel.

5 So, I guess that's the way I feel
6 about it. And I'm going to end it at that
7 point. But just to say that I think again
8 there are so many distortions, omissions, and
9 well, I would say analyses in the SC&A review
10 that I strongly disagree with, and I've
11 registered my disagreement.

12 I got it on October the 31st. I
13 couldn't possibly respond to that fully in one
14 day. And so, I'm not even going to -- that's
15 the extent that I'm going to even try.

16 So, I do hope you'll listen to the
17 gentleman on the phone. He can say what he
18 wants to say, but I just think this is a
19 serious misrepresentation of all the facts
20 that we have given about the portable
21 radiography sources at GSI not mentioned today

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1 of the 250 kVp machines, for which a dose was ⁷²
2 not calculated.

3 That is inexcusable in my opinion.
4 OCAS IG-003 mandates that all sources must be
5 considered, and that a dose has to be
6 calculated. And then after you calculated the
7 dose, then you can talk about other doses
8 being bounding. But you have to do that work
9 first, and it hasn't been done for the kVp
10 sources, and it hasn't been done for the
11 iridium-192 source, and it hasn't been done
12 for the cobalt-60 source.

13 So, I consider this is all
14 unfinished NIOSH business, and I just hope and
15 feel strongly that this should be considered
16 by the Work Group. With that I'll end. I do
17 have a couple of comments to make about the
18 report by Greg Macievic, but I'll save that
19 for that time.

20 CHAIRMAN ZIEMER: Thanks, Dan. I
21 do want to respond to the interview with Mr.

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1 W, and clarify some issues there that you⁷³
2 raised. In fact, the initial interview on my
3 part was based on an assumption that there was
4 a cobalt and iridium source.

5 In December of 2009, we weren't
6 actually trying to determine that issue, and I
7 called Mr. W, based on my assumption that
8 there were both sources present. What we were
9 trying to determine was the practice of roping
10 off areas at 1.5 times the limit distance, and
11 whether he could confirm that practice.

12 And so, there were two sections to
13 the report, which I established with him,
14 based on my assumption that they were both a
15 cobalt and an iridium source. And we talked
16 about the cobalt, and you saw those. And then
17 we talked about iridium at my suggestion, and
18 got his information.

19 Then I sent him a form, with that
20 report, which you obviously saw the original
21 draft, and asked him to agree that that report

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1 was correct. That included the iridium. 74

2 Shortly after that, I got an urgent
3 email from -- I'm looking at the email here.
4 I can -- I think I can say it because -- hang
5 on. Well, it's a person that's on the phone
6 right now. But anyway, the email said -- and
7 this was shortly after the draft was issued.

8 " ' identifying information
9 redacted' called me and asked that you call
10 him on the phone. He has computer problems.
11 So, he would like to talk to you on the
12 phone." And he gave me the first -- Mr. W's
13 phone number again, and I called him, and he
14 said to me on the phone that I was incorrect;
15 that what you said was an iridium source was
16 not.

17 What I, Ziemer, had said was an
18 iridium source. He said it was not. It was
19 a small cobalt source, and that I would have
20 to change the report before he would agree
21 that it was correct.

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1 I changed the report, and if you⁷⁵
2 compare the new one with the old one, you'll
3 see that they are exactly the same, except
4 that the word cobalt-60 replaces the word
5 iridium. And then I -- and I have before me,
6 and I sent him the revised copy, and I have it
7 before me and am looking at it, the signed
8 copy by Mr. W, dated February 24th. It says
9 that the second revised report summarizes the
10 information that he provided.

11 So, all I can tell you -- and I did
12 not -- I did not initiate that change. It was
13 initiated by Mr. W at his request, and then I
14 sent him the revised report, and he agreed
15 that that was the correct one.

16 I know that he had interactions
17 with people there in between, and I said,
18 "Well, they must've told him" -- I assume that
19 someone had said, "You're mistaken." I don't
20 know what occurred at his end. I'm just
21 telling you that I'm reporting exactly what he

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1 was saying. 76

2 As far as the big source is
3 concerned, at that point the issue was not
4 when that source was in use. Mr. W's work
5 time, I believe, went on into the '70s, and
6 certainly the big source was there at that
7 time. We were not trying to establish dates
8 on those sources at that time, but rather
9 practice of roping them off.

10 So, that's the source. I did not
11 remove iridium at my own volition. It was
12 removed at the request of the individual. So,
13 I just wanted to set the record straight on
14 that, Dan, in case there's some implication
15 that I was somehow trying to remove iridium
16 from the scene. That wasn't even the issue
17 with this at that time.

18 We weren't -- I think all of us at
19 that time, because we hadn't looked at the
20 licenses or anything at that point, trying to
21 establish radiological practices for the

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1 sources.

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2 I think Dr. McKeel, you said one of
3 the individuals there also had a statement
4 they wanted to make?

5 MR. DELL: Yes, I did. My name is
6 Leroy Dell. I was employed with General Steel
7 from 1956 to 1972, or late '71, and I think
8 the doctors said that I did not do any
9 radiographer work. Yes, I did. With the
10 betatron, I did quite a bit. With the
11 radiation, I did a -- I mean a minimum amount,
12 but did help set up a lot of shots.

13 The first shot I set up, helped set
14 up, was about 40 feet from the main runway of
15 the foundry in the number 6 building, right in
16 the corner. And when we set the shot up, it
17 was with a fishing pole, or we called it the
18 fishing pole. It was a pole about eight feet
19 long, and you reach over. You uncap the
20 radiation, and it was like a plumb-bob. You
21 took a hook on the end of the pole, picked it

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1 up, and set it in what looked like a little
2 shot glass wherever you would -- had
3 positioned it to shoot the casting, to X-ray
4 the casting.

5 We got it set up, and after we got
6 it set up, we started to leave, and we didn't
7 -- we did rope the area off one-and-a-half
8 times what we were supposed to. But the
9 minute we started off, some guy raised the
10 tape and started walking through.

11 I went to the laboratory. The
12 regular radiographer went back to the betatron
13 to take some film and get some more film. This
14 was done -- I don't care what anyone says. It
15 was done daily. If the man had a shot set --
16 now, most shots with the cobalt-60 were short
17 shots.

18 So, it -- it didn't -- I mean you
19 had time to get to the laboratory and back,
20 and the shot would be ready, or you'd have
21 time to run over and get a sandwich, and come

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1 back. And now that -- that was done very
2 often.

3 And as far as the shiny, pretty
4 little cases for the cobalt-60, it wasn't
5 there when I was. I didn't see it. What I
6 saw was a big ball of steel between two
7 wheels. And they had -- I used two of them.
8 One was with the plumb-bob. The other was you
9 cranked it out.

10 Now, that was the two sources of
11 cobalt I used, unless the one with the plumb-
12 bob could've been anything. I don't know what
13 it was. And then I did use the betatron quite
14 a bit. I had the betatron turned on when I
15 was inside the betatron, inside the casting,
16 by one of the men.

17 I got out of the betatron, turned
18 the safety key off, and went around. The man
19 kept trying to turn the machine on, and right
20 in front of him on the -- on the board, the
21 control board, it showed that the key on the

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1 outside was turned off. So, I say that struck⁸⁰
2 me right then. These guys are very, very,
3 very poorly trained.

4 And I told John Ramspott. I said,
5 I don't see anything that General Steel did
6 wrong until I started thinking. Sure, they
7 did everything wrong as far as training, and
8 then when the one -- one man started signing
9 your name to film and sending them out, and
10 you were responsible, that's when I decided to
11 quit.

12 But that radiation, don't let
13 anyone -- cobalt was used. Wherever they
14 needed the cobalt, they would move it. If you
15 look at the cameras, you'll get the right,
16 true camera. One of them looked a little bit
17 like it, but it would have a hook. Not a
18 hook, a ring, like on top, and all they'd do
19 is take a little chain, and hook there, and
20 move it down the foundry or wherever they
21 wanted it.

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1 So, that radiation was used⁸¹
2 wherever they pleased. My main thing was
3 very, very poor training. And then when they
4 started signing name to film, that's when I
5 decided, hey, I didn't want no part of General
6 Steel.

7 They'd tell me to sign the film
8 off. It would be bad, and I wouldn't do it,
9 and it would be a high pressure testing, which
10 I would -- no doubt in my mind there's some in
11 the submarines now with flaws in them, and
12 there's some in high pressure generators, and
13 big dams that there's flaws in. Because he
14 would say, "Sign. Oh, that's not that bad."

15 Well, he didn't have a license. He
16 didn't know. I have a license. But he'd say,
17 "That's not that bad." He wanted to send it
18 on out, the casting on out, with as little of
19 work on it as possible.

20 Well, sure. I did too, but I
21 wanted it to be right. And when it went out,

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1 if it had my name on it, I wanted it to be ⁸²
2 right, or I wouldn't sign it. But he would
3 sign it anyway. He'd sign mine or '
4 identifying information redacted' name to it.

5 So, that was the point. And then
6 on top of -- I went up into the top of the
7 betatron one time with the man -- the betatron
8 went down, so the man goes up in the top of
9 the betatron there, and there's all kinds of
10 big, electrical transformers and everything
11 else.

12 And he takes a chain and a pole
13 with the chain on the end of it, and grounds
14 everything out. But you had to wait about 30
15 minutes before you went up. But he did that,
16 and there wasn't supposed to be anyone up
17 there in no way form or fashion. But I went
18 up there.

19 So, they were very, very lack and
20 slack in safety. And if you -- if you'd say
21 anything, you know, you were just a jerk. So,

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1 I did the next best thing. I quit, and went⁸³
2 to work somewhere else. And that's about all
3 I have to say unless someone wanted to ask a
4 question.

5 CHAIRMAN ZIEMER: Okay, thank you,
6 Mr. Dell. We appreciate that input. We're
7 going to take a 15-minute break at this point,
8 a comfort break.

9 MR. DUTKO: Dr. Ziemer?

10 CHAIRMAN ZIEMER: Yes, who is this?

11 MR. DUTKO: John Dutko.

12 CHAIRMAN ZIEMER: John Dutko. We
13 need that for the court reporter here. Thank
14 you, John.

15 MR. DUTKO: I don't understand at
16 all why there's a complete utter blatant
17 disregard for our testimony. We have given
18 mounds of testimony. It seemed like our
19 testimony is cherry-picked at best. I don't
20 understand why. It seems like at best you try
21 to circumvent -- and I don't understand.

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1 But I do know this. It is not⁸⁴
2 appreciated by the men who have gone out of
3 their way to reconstruct this. Thank you.

4 CHAIRMAN ZIEMER: Okay.

5 MR. DELL: One more statement,
6 please.

7 CHAIRMAN ZIEMER: Yes.

8 MR. DELL: I'm not asking for
9 anything at all. John Ramspott just happened
10 to call me, and said he had heard I work
11 there. I don't want anything. I'm not asking
12 anything. I don't have any axe to grind.

13 CHAIRMAN ZIEMER: Okay, thank you
14 very much. We're going to take our break.

15 MR. DELL: All right.

16 MR. KATZ: Wait one moment. Go
17 ahead --

18 MR. LUBER: This is George Luber.
19 Can I make a statement?

20 CHAIRMAN ZIEMER: Okay, George.
21 We're getting ready to take a break, but if

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1 you make it brief, we'll let you do it now, 85
2 Otherwise, you'll have to come after the
3 break.

4 MR. LUBER: Okay. In my opinion
5 strictly, I think some people are a bunch of
6 'redacted profanity'. End of my statement.

7 CHAIRMAN ZIEMER: Thank you. Okay,
8 that statement is not very helpful, but it is
9 in the record. We're going to take our break
10 at this point.

11 MR. RAMSPOTT: Dr. Ziemer?

12 CHAIRMAN ZIEMER: Yes?

13 MR. RAMSPOTT: John Ramspott. I'd
14 like to speak when you return.

15 CHAIRMAN ZIEMER: Yes. Thank you,
16 John.

17 MR. RAMSPOTT: Thank you.

18 CHAIRMAN ZIEMER: Yes.

19 DR. ANIGSTEIN: I would just like
20 to --

21 CHAIRMAN ZIEMER: We got to stop or

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1 it's going to go on. 86

2 (Whereupon, the above-entitled
3 matter went off the record at 10:37 a.m., and
4 resumed at 10:51 a.m.)

5 MR. KATZ: Okay, this is the
6 Advisory Board on Radiation and Worker Health,
7 TBD-6000 Work Group, we're back online.

8 CHAIRMAN ZIEMER: Okay, John
9 Ramspott, are you ready to make a statement?

10 MR. RAMSPOTT: Yes, sir. I am.
11 It's John Ramspott, and I certainly appreciate
12 the opportunity, having listened this morning
13 to Dr. Anigstein's report, and guidelines that
14 it be the early years. I'm going to direct
15 some issues that way.

16 I think we're looking at, maybe,
17 you said '63 and earlier to '53. So, I'd
18 first like to thank Mr. Dell for his time, and
19 I'd like to make sure, so everybody is clear,
20 Mr. Dell was the isotope supervisor at GSI.

21 Mr. Dell, that's why he did not do

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1 a massive amount of radiography, because he
2 was supervising all the other radiographers.
3 Mr. E, who was referenced as an employee from
4 '53, and some time off for the military, and
5 then going into '56, actually reported to Mr.
6 Dell.

7 So, Mr. Dell has, I think, the
8 clearest vision of what went on at GSI. We
9 recently made contact with him. He stated
10 very well. There was no priming, no trying to
11 get him to say it was inaccurate.

12 He just said it the way it was.
13 There are things that -- I mean it has to be
14 on the record. You heard what he said. The
15 cobalt, radium, that was used in the plant,
16 and his quote, "Daily." People need to
17 understand that. That matches up with what
18 all the other workers said as well.

19 I want to address Bob's report with
20 that a little bit, because blue moon, once in
21 a blue moon, once in a while, what -- well,

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1 when that's coming from people who are part⁸⁸
2 time radiographers, it may seem like once in a
3 while, once in a blue moon. But coming from
4 the supervisor, he knew better. He is the one
5 that actually made it happen.

6 Now, I want to address your
7 attention. It appears there are a lot of
8 reports being generated by everyone, SC&A. The
9 Board I hope is reviewing the FOIA information
10 to Dr. Dan McKeel. One year ago discovered,
11 with the help of a FOIA individual, and as a
12 result, all these things that we're looking at
13 right now a year ago did not exist.

14 One individual found that
15 information. One individual was not lazy. One
16 individual did better homework. I'm sorry.
17 That's how it works. Dr. McKeel got the
18 information.

19 Now, a year ago everybody said, and
20 Appendix BB will prove this, there's no
21 mention of cobalt. There's no mention of

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1 iridium. There's no mention of radium. ^A₈₉
2 year ago, none of it existed. So, for anybody
3 to be aloof and say, "Well, an 80 curie source
4 couldn't exist at GSI or iridium couldn't,"
5 they have to be blind. Look what we found as
6 a result of someone doing a lot of homework.

7 Now, there's no nice way of saying
8 it. Someone is calling all these workers
9 liars, or delusional. They sure didn't roll
10 around 750-pound pigs with cobalt sources in
11 it and not know what they were moving.

12 Now, I'm going to address the FOIA
13 again, because everybody seems to be hanging
14 their hat on that FOIA. That FOIA is an
15 organized -- in my opinion. I'm going to let
16 you -- you have to decide this. That FOIA is
17 a collection of information that GSI wanted
18 the AEC to believe. That FOIA, if you look at
19 it, Section 8, 9, 10, it says, "Those sources
20 will be used exclusively in that small
21 radiation block building." Exclusively.

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1 Here we got people telling us
2 they're used throughout the plant. This is a
3 collection of lies. You can't just -- you
4 turn that into the AEC. Well, AEC didn't come
5 back for a reinspection apparently. They
6 said, "There was no need for an inspection," I
7 think is what I saw in there.

8 It's like getting audited by the
9 IRS. Hey, they're going to see -- they're
10 going to want to see your paperwork. They're
11 going to want to see your books. I'm sorry.
12 Someone did a sloppy job.

13 Now, I'm also kind of concerned
14 with the FOIA -- you mentioned Dr. Konneker.
15 Dr. Konneker is being looked at as the guru,
16 the safety expert. He's a wonderful guy.
17 We've tracked him and know exactly what he
18 does in St. Louis. He's a benevolent
19 individual. He's probably one of the best
20 physicists around in his time.

21 But you know what? He never walked

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1 in GSI's door until December of '62. We're
2 talking about all of the time before that,
3 guys. We're talking about the early years.
4 Konneker wasn't there. Any letter or promise
5 of what he's going to do, what's going to
6 happen, that's at the tail end of GSI killing
7 all these guys. That's over with. We're a
8 little late.

9 We kind of missed the boat. As I
10 mentioned Dr. Konneker, the guy you just heard
11 on the phone, Mr. Leroy Dell, is the only
12 person that took his test and passed. All his
13 management flunked.

14 He passed the test. Now, that kind
15 of tells you who Mr. Leroy Dell is. He should
16 be your expert. Not some other people who
17 were part time. Now, there's a whole --
18 there's one big thing in the FOIA that I can't
19 even believe was overlooked, not even
20 mentioned.

21 Take a look at the section --

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1 again, I think it is Section 8. Maybe 9₂
2 Nobody mentioned it. It's about GSI's non-
3 compliance. The AEC slapped them on the
4 wrist, scolded them. "Sorry, guys. You are
5 non-compliant." And this was issues like leak
6 testing, which Paul, you raised the question
7 in one of the meetings.

8 I didn't even know what it was, so
9 I looked it up, and now when it -- it's one of
10 the big problems in GSI. In 1962, they did
11 not do leak tests. You'll see from the
12 report, there's about four items they didn't
13 do.

14 They didn't do surveys of places
15 they used the sources. I know they didn't
16 because they were using it out in the plant.
17 They did the first survey of that little block
18 building in '62, folks. Not -- you know, not
19 in '53 when all this started over at GSI. But
20 we're a little -- we're a little late.

21 Now, I hope you -- like Dan McKeel

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1 said, if this were a trial, throw all that
2 FOIA information, that fabrication and safety,
3 safety, safety extensive training. That's not
4 science. That's like science fiction. They
5 wrote a book of what they thought they ought
6 to do, what they wanted to do.

7 I don't have a radiographer that I
8 know, with the exception of Mr. Dell, that
9 went to a good scheduled training class. None.
10 Feel free to ask him. But those are some
11 thoughts.

12 You know, the surveys they talked
13 about bring up a little point everybody seems
14 to miss. How do you do an extensive survey on
15 how safe a radiation non-destructive testing
16 area is that's in the middle of a plant?

17 Well, they did that survey. I
18 don't care if they're three feet, four feet.
19 No one did a survey. There's no mention in
20 any of that FOIA. They didn't do any
21 radiation survey in the betatrons where they

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1 said they were eventually going to use the ⁹⁴
2 sources occasionally. Occasionally.

3 Their quote is exclusively. They
4 used those sources everywhere, and their
5 safety was terrible. There's no ifs ands or
6 buts about it. If you can't see that -- you
7 know, everybody brings up, OCAS IG-003.

8 I'm going to bring it up for the
9 last time in my closing. "All radiation must
10 be used in dose reconstruction." Now, I've
11 used the term, it's a law. Maybe it is not a
12 law technically. I don't know. But if it's a
13 guideline that everybody is supposed to use,
14 and you don't take all this into
15 consideration, then I think you're violating
16 that guideline.

17 So, hopefully that'll be talked
18 about a little bit more. Thank you,
19 appreciate your time.

20 CHAIRMAN ZIEMER: Okay, thank you,
21 John. Let's move onto -- well, let me see. I

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1 think Bob, you had something you wanted to
2 add.

3 DR. ANIGSTEIN: Yes.

4 CHAIRMAN ZIEMER: Bob, regarding
5 the discussion this morning. Just before the
6 break, you wanted to --

7 DR. ANIGSTEIN: There was just
8 comments that -- I assume Dr. McKeel is on the
9 line.

10 CHAIRMAN ZIEMER: Go ahead.

11 DR. ANIGSTEIN: As far as the
12 interview with -- this is quoting Dr. -- NCC,
13 Nuclear Consultant Corporation, the -- by the
14 time we got the information that he might be
15 available, it was extremely difficult to track
16 him down. And with no answer on his
17 telephone, there was one telephone that was
18 listed on the internet directory pages, I
19 finally ended up sending a letter to him by --
20 actually, I sent a letter to him by good old-
21 fashioned US Mail, because I had an address

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1 for him, and then I made contact with Sheldon⁹⁶
2 Art Gallery, Sheldon Art Center, because he
3 had endowed one of their galleries.

4 So, I spoke to the director there,
5 and he offered -- he agreed to -- actually,
6 first I contacted the St. Louis -- was it
7 Washington University in St. Louis, because he
8 was -- again, he had been a former trustee,
9 and asked them if they could convey some
10 information to him. They refused.

11 The Sheldon Art Gallery did finally
12 -- or Center did agree to send him
13 information, and I was able to finally get
14 through and talk to some young lady that
15 worked and answered his phone. And she said
16 she got the email from Sheldon Art Gallery.

17 She put it in front of him, and
18 suggested -- she gave me the private number,
19 which is actually the similar one that Dr.
20 McKeel furnished from several years earlier,
21 and suggested that I call the next morning.

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1 I was under a deadline to get the⁹⁷
2 report out. The meeting was approaching. It
3 takes a little time for me to edit and
4 formulate and format my reports. So, I can't
5 be putting information in at the last moment.
6 It doesn't make any sense.

7 So, it was agreed, and I had
8 checked with Dr. Ziemer and Ted Katz, that
9 maybe I should just call him first and find
10 out if he has any information to offer before
11 we go through elaborate scheduling, and Dr.
12 McKeel said he wanted many days notice before
13 a group participates in a phone call.

14 So, I was going to make an
15 exploratory phone call and if it was anything
16 really valuable, like look if there was really
17 some information there, then we might schedule
18 a conference call.

19 And as I reported to Dr. Ziemer,
20 Paul, and Ted Katz, we all agreed there really
21 was minimal information. I'm not sure that he

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1 had ill health or simply just a very faint⁹⁸
2 voice. And basically, he kept saying, "I'm
3 sorry. I'm sorry I couldn't help you more. I
4 really don't have any information."

5 And the information that I did get
6 is in the appendix through the report, which
7 everybody saw. The name is -- his name is
8 deleted, but the affiliation is there. So,
9 it's obvious who I spoke with. So, I don't
10 think it was in any way a violation of the
11 agreement.

12 Then the business about the sources
13 being somewhat different, I'm sure there were
14 different manufacturers. I'm sure that if you
15 looked at both the 80 curie source housing and
16 the -- made by Radionics and the Budd company
17 sources, I'm sure there might've been some
18 difference in design.

19 However, my point was that someone
20 having seen only one source, and had left the
21 employment of GSI before the other source was

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1 officially procured, may very well have
2 thought it was a large source. But it was a
3 large housing, so why put a small source in a
4 large housing?

5 Well, for whatever reason, they
6 did. And furthermore, with all due respect to
7 John Ramspott, who was just on the phone, he
8 did not send me or offer to send me -- no one
9 offered to share the picture of the Budd
10 radiography source.

11 The gentleman I interviewed simply
12 said, "Are you by any chance in contact with
13 John Ramspott?" I said, "Yes, I am." "Well,
14 tell him I have information for him." He
15 didn't say, "I have information for you." If
16 he had wished to send it to me, he did not
17 have a computer or email, but he certainly
18 could have -- I certainly would've made an
19 arrangement with him, as I did with John, to -
20 - he can use our FedEx account, so there's no
21 cost with him, and send me the information. I

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1 could copy it, and send it back to him. 100

2 No one ever offered to share that
3 with me. I did not want to aggressively push
4 it at that point. Again, it was getting very
5 late, and I had to finish my report. It was
6 late. It was late as it was.

7 So, in terms of the comment about
8 the recently deceased radiography supervisor
9 who said -- yes, I saw the email. The email
10 simply said iridium-192 was used for
11 radiography. That is true. It was used by
12 St. Louis Testing.

13 The same gentleman, a year later,
14 was present at the meeting where -- which John
15 Ramspott arranged, and I specifically asked
16 him, because I looked at the transcript, and
17 the transcript is on the web, even though it's
18 redacted. You sort of have to guess who was
19 speaking.

20 I specifically said, "Was there an
21 iridium-192 source?" And he said, "GSI did

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1 not own one. It belonged to St. Louis
2 Testing." So, this is the same one who had
3 said, and correctly, iridium-192 was used but
4 not by -- but not by GSI.

5 And then finally, Dr. McKeel
6 brought up the -- why today we did not mention
7 the 250 kVp X-ray source. The purpose of my
8 report was to say new information or new
9 interpretation of information that had
10 previously been talked about.

11 The X-ray machine was discussed at
12 the last meeting. There was no need, and we -
13 - NIOSH discussed it. SC&A responded to some
14 of their discussions. We basically agreed
15 with their assessment. We had some technical
16 comments about it, but basically agreed with
17 their assessment, and didn't need to bring it
18 up again.

19 CHAIRMAN ZIEMER: Well, the X-ray
20 sources were used in the later period anyway.
21 So, '64 on is when we had --

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1 DR. ANIGSTEIN: I think so, yes. 102

2 CHAIRMAN ZIEMER: That was actually
3 during the AEC era.

4 DR. ANIGSTEIN: I think you're
5 right.

6 CHAIRMAN ZIEMER: It was. Okay,
7 thank you.

8 DR. MAURO: This is John Mauro.

9 CHAIRMAN ZIEMER: John Mauro?

10 DR. MAURO: Before you move on, can
11 I just make a couple of observations?

12 CHAIRMAN ZIEMER: You certainly
13 can.

14 DR. MAURO: Paul?

15 CHAIRMAN ZIEMER: Yes, go ahead,
16 John.

17 DR. MAURO: Thank you. In
18 listening to everything here, I'd like to just
19 make an observation I think is important in
20 keeping with the idea that we're trying to
21 zero on what are the important SEC issues.

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1 And I think a lot of factual¹⁰³
2 information that we discussed might be in some
3 degree dispute, and some of that factual
4 information is critical to the SEC, and some
5 of it is marginal.

6 I'd like to point out that whether
7 the cobalt-60 source was there in '64 or '68
8 is marginal. The real issue was there was
9 beginning in '62 or '63, when there was
10 clearly some degree of control, and there was
11 a health physics program, and there was
12 badging.

13 So, that date, that dispute, seems
14 to be a marginal issue. Iridium-192, whether
15 it was owned by the St. Louis Testing or
16 perhaps by GSI, again in the earlier years, it
17 becomes a marginal issue.

18 The issue that is central has to do
19 with the degree to which there was access
20 controls, and movement of material to other
21 locations, where there may have been a

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1 breakdown in access controls during the use¹⁰⁴
2 these smaller sources.

3 What I heard, what I heard, is that
4 during one interview, there was a considerable
5 amount of control in the early years, through
6 1962, as indicated by Bob's report. But I
7 also heard Mr. Dell on the line, indicating
8 that there -- I did not hear him say that the
9 sources were used all over the plant. I did
10 hear him say they were used in building 6, and
11 quite frankly, I'd like to hear him say
12 whether he felt these sources were in fact
13 moved all over the plant.

14 MR. DELL: I can tell you.

15 DR. MAURO: Please.

16 MR. DELL: It was moved all over
17 the plant from the betatron to 6 building. Any
18 building they wanted to use it in, if they had
19 a casting and didn't want to move the casting
20 or -- we would take the camera, hook it on the
21 crane, move it down to wherever, down to the

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1 foundry or wherever it was -- building it ^{was}₁₀₅
2 in and set it down. That crane would pick it
3 up and take it in all over the plant.

4 DR. MAURO: And I have one more
5 brief question. When they did move it at
6 these locations, I wasn't quite clear as to
7 these are generally relatively short shots.
8 Did you observe -- I guess starting in 1955, I
9 believe that's when you said you had -- or
10 '57. I'm not sure of the date.

11 MR. DELL: I started in the last of
12 '55 and stayed until the first of '72.

13 DR. MAURO: Okay. During that time
14 period, when they were moved or when they were
15 in building 6, either way, did I hear you say
16 that there were barriers put up, but -- and
17 that -- but there was not a degree of control
18 over those barriers? That you expected -- in
19 other words, I'd like to hear a little more.
20 Your sense was that -- that they were -- there
21 was not people patrolling those barriers

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1 during the time when the shots were being¹⁰⁸
2 taken? Or was it generally that the shots
3 were short, and that the barriers were in fact
4 in place and controlled?

5 MR. DELL: The barriers were
6 supposed to be, and every time I've seen it,
7 the barriers were put up. If men wanted to
8 walk through there, I'd say barriers. All it
9 was was a tape, like the police tape, around,
10 that said, "Radiation area." They were put up,
11 and they were put up 50 percent further than
12 they had to be put up.

13 If anyone wanted to walk through,
14 and walk within two inches of the casting,
15 they would just lift the tape, walk through
16 and walk right on, rather than to walk around
17 it. And -- and they wouldn't do it if the
18 operator was there, but like I said, the
19 operator may be in the little brick building.
20 After he set the shop up, he may go sit in the
21 little concrete block building, or he may go

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1 to the betatron, or he may go get a sandwich¹⁰⁷
2 at the lunchroom or something.

3 It was not -- I tell you, they were
4 very lack in safety. Very, very lax in
5 safety.

6 DR. MAURO: Thank you, Mr. Dell. I
7 appreciate your helping me out with this.

8 MR. NETON: Mr. Dell, this is Jim
9 Neton. I have one other question. You say
10 that these shots were done all over the plant,
11 but could you estimate what percentage were
12 done in the room, exposure room, versus about
13 the plant?

14 MR. DELL: No, I cannot because I
15 was not in the plant that much. I was more in
16 the laboratory in the earlier years.

17 MR. NETON: So, you don't know
18 whether an occasional shot could've happened?
19 I think I hear you say very strongly that they
20 could've occurred anywhere, and we've heard
21 that. But I guess the question in my mind is

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1 what frequency were they done anywhere? 108

2 MR. DELL: Well, you know, every
3 time I went in the plant -- I'll put it this
4 way. I don't know what frequency it was, but
5 every time I walked down to give the men a
6 shot to shoot or anything, I'd not seen one
7 out of ten that would be in that block
8 building. They would be on the outside of the
9 block building.

10 MR. NETON: Okay, thank you.

11 CHAIRMAN ZIEMER: Was this true of
12 the radium sources, as well as the cobalt?

13 MR. DELL: Now, you know what?
14 Everyone says radium. I don't know which was
15 radium and which was cobalt. I know that we
16 had a plumb-bob. I even remember when it got
17 stolen. If it would've been policed, it
18 wouldn't have got stolen, but it got stolen.
19 And we had the cameras.

20 So, I don't know what -- I know
21 that it said -- we called them. They said,

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1 "Well, cobalt 60." But the plumb-bob, I don't¹⁰⁹
2 know what it was. It could've been radium. It
3 could've been cobalt. But I know we did use a
4 plumb-bob, and we did use the camera.

5 CHAIRMAN ZIEMER: Well, I think it
6 is pretty well established that the cobalt
7 source replaced the radium sources in 1962.

8 MR. DELL: Well, radium could've
9 been the one that we used with a fishing pole
10 then.

11 CHAIRMAN ZIEMER: I think the
12 testimony of the other workers indicates that
13 that was the case.

14 MR. DELL: Well, if it was, yes, it
15 was used wherever they wanted to use it.

16 CHAIRMAN ZIEMER: Okay, thank you.

17 MR. RAMSPOTT: Dr. Ziemer?

18 CHAIRMAN ZIEMER: Yes?

19 MR. RAMSPOTT: John Ramspott, if I
20 may ask -- just clarify a point. I thought if
21 I heard Leroy Dell correctly, he said one out

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1 of ten seemed to be in the block building. So
2 that means 90 percent were done out in the
3 plant. Is that correct?

4 CHAIRMAN ZIEMER: Well, we heard
5 two things. One was that he -- he wasn't
6 there very much to see, but the ones that we
7 saw were. So, he apparently saw a small
8 fraction of the total, but that fraction was
9 mainly around the plant is what I understood.

10 MR. DELL: And you're both right.

11 CHAIRMAN ZIEMER: Yes, okay. And -
12 - and on this, someone asked earlier if we're
13 disregarding worker testimony. The fact is we
14 have conflicting testimony on many of these
15 issues depending on who has brought it up. But
16 okay, Bob, you have a comment?

17 DR. ANIGSTEIN: Well, just to Mr.
18 Dell, we may be -- let's see. If you saw --
19 if you witnessed radiography going on in the
20 plant, they'd be rather conspicuous because
21 there were signs around the ropes or tapes

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1 around, but it would not -- but if ~~the~~
2 radiography was going in the radiography room,
3 there would be no way of knowing about that
4 unless you actually walked into that room to
5 observe it.

6 So, would you always know that
7 there was radiography going on in that room if
8 you were --

9 MR. DELL: If I went down, I would
10 walk in the room. If I went down to talk to a
11 man that was supposed to be doing this, of
12 course I would walk in the room.

13 DR. ANIGSTEIN: I see. And the
14 room -- wasn't the room kept locked so
15 outsiders couldn't walk in?

16 MR. DELL: It would not be locked
17 if the man was there.

18 DR. ANIGSTEIN: I see. Okay.

19 MR. DELL: And if it was locked,
20 then I knew he was with the betatron or
21 somewhere else.

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1 DR. ANIGSTEIN: I understand, yes¹¹²

2 That makes sense.

3 MR. RAMSPOTT: Dr. Ziemer, John
4 Ramspott.

5 CHAIRMAN ZIEMER: Yes, John?

6 MR. RAMSPOTT: Just like to remind
7 everybody they had two cobalt sources, and
8 they had two radium sources. So, something
9 could be going on in the block building, and
10 in the plant simultaneously.

11 MR. DELL: Yes, and it was at
12 times.

13 CHAIRMAN ZIEMER: Yes, good point.

14 MR. RAMSPOTT: We never discussed
15 this, but I assumed that.

16 CHAIRMAN ZIEMER: Yes, I think that
17 certainly makes sense.

18 MR. RAMSPOTT: I wouldn't think
19 somebody would want to be in with both cobalt
20 cooking at the same time.

21 CHAIRMAN ZIEMER: Right.

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1 DR. ANIGSTEIN: Actually, according¹¹³
2 to the first radiographer I interviewed this
3 past month, I asked if it was possible, just
4 for my own bounding analysis, to use the two
5 radium sources simultaneously inside a
6 radiography room, and he said, "Sure. You just
7 put some blocks of shielding in between, and
8 you could have two castings. You could be
9 doing two castings simultaneously near each
10 other, just as long as there was shielding so
11 you wouldn't be exposing the film from one
12 casting, from the source that was being used
13 by the other one."

14 MR. DELL: But that was not a
15 practice.

16 CHAIRMAN ZIEMER: But it could be
17 done.

18 MR. DELL: It was possible to do
19 it, but it was against the rules, and it was
20 not a practice because scatter radiation would
21 come back in on the other one.

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1 DR. ANIGSTEIN: Sure. 114

2 MR. DELL: You'd have to set it up
3 exactly right. I mean it would have to be
4 perfect.

5 CHAIRMAN ZIEMER: I think that's a
6 good point.

7 MR. DELL: Radiation interfering
8 with the other film. So, it was a no-no.

9 CHAIRMAN ZIEMER: Yes, I think
10 that's a good point because it would mess up -
11 - they'd mess each other up with scatter.

12 DR. MCKEEL: I will back up that
13 statement.

14 CHAIRMAN ZIEMER: Yes. Okay, any
15 further comments on these issues right now? We
16 want to also cover the film badge issue here
17 before lunch. Okay, we have the NIOSH White
18 Paper on Film Badge Response, and I think the
19 author of that paper is also on the phone with
20 us today so that he can answer questions on
21 that if necessary, and we have that -- well,

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1 let me ask if there's any other -- Greg, ^{do}₁₁₅
2 you want to make any statements on your paper
3 to start with, then we'll have SC&A give their
4 critique on it.

5 DR. MACIEVIC: Sure, yes. Let me
6 give a basic idea of what I was trying to do
7 with the paper because there seems to be
8 discussion about all the energy ranges, the
9 filters, the graphs and all that.

10 The whole point of what I was
11 trying to show, the question was what happens
12 to a dosimeter that is exposed to high energy
13 photons? I want to preface by saying I worked
14 at Landauer 1979 through 1984, involved with
15 research and quality control on film. TLDs
16 and track etch type dosimetries.

17 So, I am familiar with Landauer and
18 the types of film. What I was trying to show,
19 and it is basically simple, is this: one, that
20 as the photon energy goes up, film of any type
21 and metal filters of any type, the metal

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1 filters will cause an over-response of the ¹¹⁶
2 film to high energy photons.

3 And the example, and through my
4 experience, one of the things that was
5 commented on was the Landauer having a plus or
6 minus 20 percent accuracy all the way up to 6
7 MeV. And that is true, but the one thing that
8 has to be mentioned: at Landauer that 6 MeV
9 was nitrogen-16, which produces under a lead
10 filter an over-response of the film.

11 If you didn't tell Landauer that
12 this was being exposed to nitrogen-16 or a
13 high energy photon, they would not make a
14 correction, and you would get a higher dose on
15 that dosimeter than you would if it was it's
16 full response with respect to cesium or
17 cobalt. In that 0.5 to 1 MeV range, the
18 response is essentially flat. It starts to
19 tail up at about 4 to 5 MeV, and you start to
20 go up.

21 That was the purpose of the two

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1 graphs, and I chose those two graphs to show
2 that for tungsten, for lead, and the point
3 being any high-z material; if you've got high-
4 z, you've got high energy photons. You're
5 going to get an over-response of the film.
6 It's not going to not respond. It's going to
7 over-respond.

8 And now, you can get into things
9 about, "Well, orientation of the film, the
10 type of dosimetry," which is totally
11 irrelevant to this, if a DuPont dosimeter had
12 metal filters, which they did, it's going to
13 have an over-response.

14 Now, the question you want to go
15 and say, "Well, how much do you make the
16 correction to that, and all that? But it is
17 not an SEC type issue. It's more of a
18 correctional factor for the dosimetry issue
19 because the dosimeter does work.

20 I think even Bob Anigstein shows
21 that in doing his Monte Carlo simulation that

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1 he uses, as a justification, the dosimetry¹¹⁸
2 say, "See my experiment work." Now, if the
3 dosimeter didn't work, then you wouldn't use
4 that as a justification.

5 The dosimetry does go there. It's
6 not a question of that you don't know the
7 dose. It's that the dose isn't over-
8 responding. And that was basically what I was
9 trying to show. Also, the graphs are from the
10 1960s, and I've tried to get from the books
11 and things that I had in papers that refer
12 back to things that were done in the '60s to
13 film that was used in the '60s, and show that
14 there is an over-response as you get past that
15 1.022 MeV; you will start to see a rise in the
16 curves.

17 And it is there for the lead
18 filters, with Kodak film; it's there with the
19 tungsten. I'm sorry, tantalum filter in that
20 one batch that's there, and that really the
21 point of it. They didn't try to go beyond

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1 that, but that -- the question was does this
2 dosimeter respond?

3 Well, it does respond, and it over-
4 responds. It is up now to a dose
5 reconstructor's discussion as to how you
6 address that over-response, but you distinctly
7 have over-response of the film.

8 Let's see. I had one other -- oh,
9 I recently, as of yesterday, so I'm using --
10 when I talked about dose over-response, and
11 the question brought up, "Well, are you
12 talking dose or intensity?"

13 Well, the relative response to the
14 film does increase when you compare it to
15 cesium calibration, or a cobalt calibration
16 doesn't matter. That film rises when you
17 compare high energies to those energies.

18 I came upon an abstract for a
19 paper, which I think I'll get -- have put out
20 on the internet, the web for you guys to take
21 a look at. But so far, I only have the

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1 abstract. And here is the abstract, and this¹²⁰
2 is from D.M. Quinn, radiological engineer,
3 Power Authority State of New York, Indian
4 Point Number 3 Nuclear Power Plant, Buchanan,
5 New York.

6 It's a paper from 1980 under
7 discrepancies from film and thermoluminescent
8 dosimetry readings at an operating power
9 reactor, and the abstract says, "The results
10 of exposure measurements using film badges and
11 thermoluminescent dosimetry were compared in
12 operating nuclear power plants."

13 The film badge over-responded to
14 the high energy nitrogen-16 gamma rays
15 produced under power. All the TLD did not,
16 because TLD is lower-z material. So, it is
17 not over-responding like the film.

18 And it says, "Discussions of
19 charged particle equilibrium and energy
20 dependence are included. The cause of the
21 over-response was determined to be the excess

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1 pair-production electrons created because ^{of}~~121~~
2 the high atomic number and the lead energy
3 compensating shields surrounding the film and
4 the film itself. Because film has silver, it
5 also over-responds."

6 So, my point was not to say, "I'm
7 talking about just Kodak film, or DuPont film
8 or any of these others." I'm saying if you
9 got a film, you've got high energy photons,
10 and you've got metal filters. You're going to
11 get an over-response. That's basically my
12 summary.

13 CHAIRMAN ZIEMER: Okay, thanks,
14 Greg. And I just want to actually confirm one
15 piece of information for everyone on those
16 early Landauer badges, they actually have
17 three filters, and I confirmed this with the
18 individual who is your -- on your reference,
19 Greg, it is the third author. You'll
20 recognize that as your old boss -- Landauer.

21 The three filters in all the

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1 Landauer films in those days -- or badges,¹²²
2 rather, were lead, aluminum and plastic. And
3 then there was an open window for the betas.
4 But so, the lead high-z would actually over-
5 respond I think more than your curve would
6 show, which is for -- was it titanium or?

7 DR. MACIEVIC: Right.

8 CHAIRMAN ZIEMER: So, there was
9 some question, I think, raised as to what the
10 filters were in those Landauer badges. I did
11 ask whether they ever changed it for different
12 users, and the answer was no. It's the same
13 regardless of the user.

14 And as I said -- as he said, if you
15 -- if it had -- if they didn't tell him they
16 were using high-energy stuff, then they would
17 end up giving them the high reading. Okay,
18 Bob, you have a comment.

19 DR. ANIGSTEIN: Yes, that makes
20 very good sense because, on the Landauer film
21 badge reports at the time, the separate

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1 columns for low, medium and high energy
2 gammas, and that would correspond to using the
3 plastic, the aluminum and the lead filters.

4 CHAIRMAN ZIEMER: Right, because
5 they had different densities under each of
6 those, and actually identify and compare
7 those. Now, Bob, do you want to go through
8 your analysis here?

9 DR. ANIGSTEIN: Okay. Well, first
10 of all, our report was based on a critique of
11 Dr. Macievic's report as such -- the
12 discussion we just heard on the phone actually
13 was very clear. I would say it was more --
14 somehow I got more out of it than I did out of
15 reading the original paper, the original
16 report.

17 But I'll go through -- since
18 obviously I prepared this earlier, I'll just
19 go through my quick -- quickly my independent
20 -- it's more of an independent analysis to --
21 which ended up confirming the conclusions.

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1 And what we did was we said ~~the~~¹²⁴
2 first reaction was -- before we can talk about
3 the film badge response to different energies,
4 the question is what energy were the workers
5 exposed to. They obviously did not stand in
6 front of the betatron beam or they wouldn't --
7 they wouldn't be around very much longer.

8 So, we went back to the original
9 MCNP analysis that we did back in -- for the
10 report that was first issued in March 2008,
11 and it was a very easy job in terms of labor
12 because everything was set up; the only thing
13 we hadn't done at the time because we saw it
14 was -- didn't think there was any need for it
15 was do an energy spectrum. We just did the --
16 you know, what is the dose, and what is the
17 exposure rate, and certain revisions.

18 So, now, we just went back and dug
19 up the same pile, and we went and basically
20 changed one line. We changed a few lines in
21 the input file. I think literally one line to

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1 produce by energy bin, the exposure rate. 125

2 Not the photon flux -- we're
3 interested in the photon flux; we're
4 interested in how much of the exposure is due
5 to 10 to 15 keV photons. How much of it is 10
6 to 10.1 keV photons, and so forth. It would
7 take us too long. There were a number of
8 locations in the first one. We would just
9 pick two important ones. Some of the
10 locations that we originally did were fenced
11 off. No one would likely have ever been
12 there.

13 One was in the control room, where
14 the operators would stay during the shot, and
15 another one was this restroom, which was --
16 here it is shown practically line of sight to
17 the betatron in this particular position. This
18 is, by the way, not the customary position for
19 the betatron, but it was one that was used --
20 the casting is on the railroad track, and some
21 fraction of the shots were done that way, and

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1 there was a greater degree of scattered¹²⁶
2 radiation both toward the control room, and
3 towards the outside areas.

4 This is shown now as an empty
5 space. Only recently, looking at the FOIA
6 information, it turns out there was a two-foot
7 wall here. However, based on the original
8 FUSRAP reports, where they went in to clean up
9 back in the -- what was it? In the '80s. They
10 showed an open door here.

11 So, I don't know, I -- I go by the
12 prior report because that was done by the
13 person doing the radiation survey, very
14 carefully drawn.

15 Anyway, but we -- but I kept this
16 because this is the extreme. There's no
17 shielding. Here is the number 1. Here is the
18 number 6. And here is the exposure rate in
19 the number 1, the red dots, inside the control
20 room as a function of energy. And see, the
21 energy peaks at about 105-110 keV. Then it

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1 goes down past 1 MeV. 127

2 It goes down very low, and here 10
3 MeV and the curve actually goes up to 25, but
4 it's just flat. So, no point taking up space
5 with it.

6 CHAIRMAN ZIEMER: That's because
7 there are virtually no photons of that energy
8 that actually show up in the control room. Is
9 that --

10 DR. ANIGSTEIN: Right, right.

11 CHAIRMAN ZIEMER: Yes.

12 DR. ANIGSTEIN: And this I
13 superimposed on the drawing that was -- well,
14 I went back to the original source because I
15 was able to get a better copy, make a better
16 copy of the drawing. But it appears in Dr.
17 Macievic's report also.

18 Here is a response with the 0.02
19 inch, or the half a millimeter, tantalum
20 filter. And it is right in the sweet zone.
21 It's right in the nice, flat region of that

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1 film response. It doesn't under-respond. ~~It~~^{It}
2 doesn't over-respond.

3 That seems to have been calibrated
4 in cesium. This is the point -- this would be
5 the cesium energy, and it seems to be pretty
6 close to the 1.0 line. So, by the way, the
7 graph did not show those lines. I
8 superimposed them to make them easier to read.

9 So, apparently it was calibrated
10 against cesium, and it gives a nice response,
11 a slightly lower response here, but not by
12 much. Maybe five percent. So, it looks like
13 the film badge is pretty good for that, for
14 that spectrum.

15 Now, here's the spectrum within a
16 different form, a cumulative exposure rate in
17 the restroom, the unshielded restroom, which
18 in reality was a little more shielding than we
19 had. And even here is a harder spectrum, but
20 even here, if you look at the 2 MeV, the
21 cumulative is 0.5, meaning 50 percent of the

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1 exposure is due to photons below 2 MeV, and
2 the other 50 percent is due to exposures
3 above 2 MeV.

4 You want to get up to slightly over
5 9 MeV, and that encompasses 90 percent. So,
6 then it just trails off. You don't -- what
7 happens is a 25 MeV electron gives almost --
8 rarely gives off a 25 MeV photon. All the
9 photons are less than 25 MeV.

10 Then finally, I just reproduced the
11 other drawing from Dr. Macievic's paper, which
12 he copied. I don't have the original source
13 from it. And here, it shows this is -- this
14 is one using a filter. It's a combination
15 filter, a total of 1 millimeter, combining tin
16 and lead, and again show a comparable curve
17 just looking at the -- the 90 degree -- the
18 normal incidence.

19 A zero degree is going to be
20 straight at the film. And they keep doing
21 that. The highest point here is about 2.2

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1 MeV. It keeps going up, which confirms what
130
2 Dr. Macievic said.

3 Then finally, as a quotation, and
4 this was a study done at Los Alamos by the
5 author, Ellery Storm, a very prolific writer.
6 So he and a man named Israel put out the
7 definitive -- it's still used -- calculations
8 of attenuation coefficients for all from z
9 equals 1, z equals 100, as an aside. Anyway,
10 this is the direct quote from his abstract.
11 Response of Eastman type K and DuPont 552 film
12 on high energy were investigated. Both types
13 of film are found to be energy-independent
14 from 0.4 to 2 MeV. For a given roentgen
15 value, a given response in terms of density is
16 obtained and the effective energy increases
17 beyond 2 MeV.

18 The motivation for doing this study
19 was they had a 22 MeV betatron made by Allis-
20 Chalmers, and the -- there were -- they had
21 the same concern: is the film badge still good

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1 at those high energies. Because previously^{ly}₁₃₁
2 they had been used primarily for medical X-ray
3 work, lower energies, and the answer was yes,
4 it is. And they did use the 22 MeV betatron
5 to create exposures of that same film, and the
6 fact was it was good.

7 Then the information that we
8 obtained, which is comparable to -- Dr. Ziemer
9 talked to him, and Greg Macievic gave
10 information from the official -- senior
11 official at Landauer made the following
12 statements. He said they had large -- he
13 didn't say anything to my contact about
14 aluminum.

15 He had large filters, including a
16 lead one, and he said he had good response to
17 high-energy air production in the lead, and
18 good angular response with very large angles.

19 For people that may not be quite
20 familiar, what happens is the reason film by
21 itself would not be good, like a bare film at

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1 high energies, is the interaction rate ^{of} ~~132~~
2 these high-energy photons per millimeter is
3 actually greater than in the body because of
4 the response in the film.

5 It is silver with a Z of 47,
6 bromine Z equals 35. However, the energy
7 that's liberated by the energy interaction
8 does not stay in the film because it's so
9 thin. So, the actual energy deposited would
10 be smaller.

11 However, with the lead behind it,
12 you get both the high interaction, even higher
13 interaction, Z 82, and the energy does stay
14 in. The electrons do get captured, and they
15 in turn give off secondary electrons and low
16 energy photons to expose the film.

17 So, the lead, on the one hand, we
18 think of as a shield. But actually, it is an
19 intensifier. It is used in other X-ray work,
20 medical X-ray work to make the film more
21 sensitive. You put in the thin lead screen

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1 behind it. 133

2 So, this had -- in his opinion,
3 there were -- at that time, there were
4 calibrated with cobalt 60, which has a --
5 which is by the way the same -- my impression
6 is that this is -- this -- here you have
7 calibration of cobalt 60. It doesn't say so,
8 but this X right on the 1, 1.0, is equal to
9 approximately 1.2 MeV, and cobalt 60 has an
10 average energy of 1.25. So, this is clearly
11 what was used for calibration.

12 And they were calibrated from 60,
13 and this official said he would not expect
14 deviation by more than 10 to 15 percent. They
15 used DuPont film, and it was calibrated in
16 air. So, I think that we can put this issue
17 to rest probably more conclusively than almost
18 any other issue that we've encountered. The
19 film badges were, with the array of filters,
20 and with Landauer's knowledge and exposure of
21 processing them where they took all the

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1 exposure fields under consideration, and ~~end~~¹³⁴
2 up with a dose based on calculation, utilizing
3 the exposures under the no filter, plastic
4 filter, aluminum filter that was the case lead
5 filter. It's a pretty good one.

6 And with all the modern techniques
7 now, according to our colleague Joseph
8 Zlotnicki, who is the former vice president of
9 Landauer, he said he would use -- even despite
10 everything, he would use film today. The only
11 limitation would be that for very high doses,
12 and we're talking about around 100 rem, the
13 film response is non-linear, meaning if you go
14 into the very high dose region, you double the
15 dose. You don't double the density. So, it
16 sort of tapers off, and you don't get -- but
17 for the medium or low -- but medium doses, he
18 said it's perfectly good, even though it's
19 been replaced by TLDs.

20 CHAIRMAN ZIEMER: Well, and by high
21 here, I think you're talking about almost

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1 lethal doses, where they have accident -- 135

2 DR. ANIGSTEIN: Yes, I think so.

3 CHAIRMAN ZIEMER: Yes, such as
4 criticality accidents where the film badges
5 are not useful any longer.

6 DR. ANIGSTEIN: Yes.

7 CHAIRMAN ZIEMER: Thank you. Okay,
8 I think we want to give the petitioner an
9 opportunity to ask questions also on the film
10 badges.

11 MR. DUTKO: Dr. Ziemer?

12 CHAIRMAN ZIEMER: Yes.

13 MR. DUTKO: John Dutko, sir.

14 CHAIRMAN ZIEMER: Yes, sir.

15 MR. DUTKO: How do you calibrate a
16 film badge you don't have on a good portion of
17 the time? I said before, and it seems like
18 nobody cares to listen, when we were working
19 magnaflux, magnaflux operators were never
20 issued film badges. They weren't worn outside
21 of the betatrons, period.

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1 I don't know what about that is not
2 understood right now but thank you, sir.

3 CHAIRMAN ZIEMER: Yes. Well,
4 actually in the NIOSH proposal for
5 reconstructing doses, they have other methods
6 for handling those individuals who are not
7 wearing film badges. Right now, we're --
8 we're simply addressing the reliability of the
9 film badge data itself that we do have. We
10 have this at all sites. It is the -- are the
11 film badges reliable for what they're trying
12 to measure? And that was --

13 MR. DELL: Can I make a statement?
14 I think I can clear that up.

15 CHAIRMAN ZIEMER: Yes.

16 MR. DELL: When he left and worked
17 in magnaflux, he would not be in that block
18 building. And the block building is the only
19 place that they were supposed or -- you know,
20 when they set it up to do the X-raying. But
21 he may be working within 15 feet of a casting

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1 setting out in the building that was being ~~X~~₁₃₇
2 rayed.

3 Like I said, they did it daily, but
4 that's the reason he wouldn't wear a film
5 badge down there because it wasn't supposed to
6 be anything outside that block building. So,
7 that's the way it was set up, and he's right
8 when he left and he was going to magnaflux, he
9 didn't wear a film badge.

10 CHAIRMAN ZIEMER: Yes, we
11 understand that, and -- and actually NIOSH has
12 proposed a way to compensate for that with
13 additional assignment of additional exposure
14 beyond what a film badge would have recorded.

15 MR. DELL: I hope that's cleared
16 up. I'm sorry if --

17 CHAIRMAN ZIEMER: Yes, that's
18 helpful. Thank you. Any other comments from
19 the petitioner?

20 MR. RAMSPOTT: Dr. Ziemer, it's
21 John Ramspott.

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1 CHAIRMAN ZIEMER: Go ahead. 138

2 DR. MCKEEL: Wait a minute.

3 MR. RAMSPOTT: Did somebody else
4 have a comment? Are you ready for me, Dr.
5 Ziemer?

6 CHAIRMAN ZIEMER: Yes, go ahead.

7 DR. MCKEEL: Can you all hear me?
8 This is Dan McKeel.

9 CHAIRMAN ZIEMER: Oh, I can hear
10 you now.

11 DR. MCKEEL: Actually, the
12 petitioner, the co-petitioner, hadn't had a
13 chance to comment.

14 CHAIRMAN ZIEMER: Yes, I asked if
15 the petitioner had comments, and I guess we
16 weren't hearing you at first, Dan. Go ahead.

17 DR. MCKEEL: Can I go on and make
18 my comment?

19 CHAIRMAN ZIEMER: Oh, sure. Sure.

20 DR. MCKEEL: Good. Well, I have a
21 couple of comments. Number one, when I read

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1 the SC&A review of Greg Macievic's paper¹³⁹
2 film sensitivity, what I was impressed by was
3 that Dr. Anigstein actually had numerous
4 criticisms of the methods within this paper,
5 including the validity of many of the
6 references that were given, and used terms
7 like irrelevant and so forth.

8 Then, Dr. Anigstein went on, as he
9 said, to do an independent analysis, which
10 again, as far as I am concerned is doing
11 NIOSH's work. But anyway, he came to
12 basically the same conclusion: that this film
13 was sensitive -- overly sensitive and hyper-
14 responded to high-energy photons.

15 So, that is the NIOSH paper, and
16 the SC&A response. What is amazing to me
17 that's left out of this story is that at the
18 September the 20th meeting, John Ramspott
19 mentioned that he was going to acquire through
20 the generosity of Leroy Dell, who is on the
21 phone, Mr. Dell's actual GSI film badge and

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1 his pocket dosimeter. And John put that into
2 the record. 140

3 Well, actually that meeting
4 happened and occurred, and John did get the
5 badge, and on October the 6th, I believe, I
6 sent the Work Group a picture of Mr. Dell's
7 badge, and lots of information about it.

8 One thing that was clear from
9 examining the film packet, which had Leroy
10 Dell, badge number 30, and 2084, which is the
11 program -- film badge program that Landauer
12 conducted for General Steel Industries. It
13 had the type film clearly written on there,
14 which was DuPont Type 544.

15 Now, left out of Dr. Anigstein's
16 analysis, and left out of Greg Macievic's
17 original paper, is the fact that we know what
18 at least one badge that actually was used at
19 the time at GSI, what the film badge type was:
20 DuPont type 544.

21 So, I started doing a little bit of

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1 independent analysis in reading about just
2 that specific -- I thought specific, unique
3 type of film. And what I found out is DuPont
4 makes a large number of different kinds of
5 films, and they do change their
6 characteristics, and emulsino characteristics,
7 over time.

8 But anyway, here's one description
9 of DuPont type 544 film that I found in a Los
10 Alamos document, which has the title of
11 P9/00420212, and there is a section in there
12 on film badges, and it said, and I quote,
13 DuPont type 544 film packets were used to
14 measure the integral gamma dose at all
15 stations. They were measuring atomic bomb
16 blasts.

17 This packet contains a sensitive
18 film, type 555, which indicates doses from
19 0.01 to 6R, and an insensitive film, type 834,
20 which measures doses from 2 to 10 to the third
21 R. A 40 mil lead strip surrounded the film so

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1 that gamma exposures could be distinguished¹⁴² in
2 the presence of beta radiation.

3 Then it just notes, the film packet
4 was contained in a protective plastic wrapper
5 for placement in the field.

6 So, my comment is that although Dr.
7 Macievic had well outlined that, based on his
8 exposure working at Landauer, that his
9 comments are applied to a wide range of films
10 that are used in film badges.

11 But my issue is, if you know the
12 type of film used at GSI, that's the point.
13 That's what we're talking about here. We're
14 talking about General Steel Industries. We're
15 not talking about all the other sites. You
16 know, we're not talking about generic issues.

17 We're talking about a specific
18 issue: what did the GSI film badges register
19 with respect to high-energy photons? And so,
20 both of those analyses should have used DuPont
21 type 544 film, and as a matter of fact, it

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1 would be interesting to know what was ~~the~~¹⁴³
2 response characteristics just as a scientist.

3 It would be interesting to know
4 what were the response characteristics of the
5 two types of film emulsion that were in film
6 544, that is, sensitive film 555, insensitive
7 film 834.

8 And I would just comment that if
9 Mr. Macievic worked at Landauer, and if Dr.
10 Ziemer had a private conversation with a
11 Landauer employee, and Dr. Anigstein mentions
12 in his report that he had a private
13 communication with a senior Landauer person
14 through his colleague, Joe Zlotnicki, then why
15 is it that, among all those three interviews
16 with high-level former and present Landauer
17 employees, could you not -- and we know the
18 film badge program. That's not an issue, 2084
19 -- why could you not know from their extensive
20 records what type of film was used in their
21 film packet, and what type of filters were

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1 used in their film badges, and then key ~~the~~^{the}
2 analyses by both NIOSH and SC&A to those
3 specifics?

4 And so, I'll just put that out
5 there. I don't necessarily mean that the
6 analyses are invalid. I do think that, again,
7 SC&A was duplicating work that NIOSH had done.
8 They already criticized NIOSH's methodology,
9 which was severe, and then went on and
10 performed their own analysis.

11 But I would say to you, as a
12 scientist, there is a principle that, you
13 know, you come -- if you have to use surrogate
14 data or you have to use co-worker data, well,
15 then you can use that under certain
16 circumstances. But on the other hand, if you
17 have -- if you know the type of film, and you
18 know the type of filters, base your analysis
19 on those actual facts, and that wasn't done in
20 this case.

21 Frankly, when everybody claims

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1 they're using the best science available, ^{to} ~~145~~
2 me that's simply not true. It doesn't square
3 with the facts. All they had to do, all that
4 NIOSH, all that SC&A had to do -- after all,
5 they both interviewed Mr. Dell -- was to find
6 out about the film badge.

7 I can promise you from being a
8 silent observer of the last interview that
9 that topic didn't even come up.

10 So, I would still think that to put
11 this issue to rest, which I don't consider has
12 been done, then both NIOSH and SC&A should
13 weigh in with specific, short reports on
14 whether, knowing that DuPont type 544 film was
15 used, and finding out exactly what filters
16 were used in the Landauer badges at GSI. Not
17 just in general, but at GSI, then to update
18 their analyses. If the conclusion is the
19 same, well, then that's fine with me. Thank
20 you.

21 CHAIRMAN ZIEMER: Dan, I want to

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1 make a partial response to that. The issue¹⁴⁶
2 here of course was -- in the beginning was a
3 general question: do film badges -- can film
4 badges correctly read the high energy photons.

5 Now, that was sort of what Greg was
6 looking at in a generic sense. The fact that
7 Landauer has a specific film and specific
8 filters, we don't have -- in my opinion, we
9 don't have to reanalyze that. Landauer has
10 already done that. They know what the
11 response is.

12 They actually know what the filters
13 are. We don't have to reproduce what Landauer
14 already has done and has been doing for years.

15 The question was, could we rely on their
16 results. Are they in fact correcting for the
17 fact that there's high-energy photons
18 involved? Can they see that?

19 The answer from Landauer is yes,
20 and generically, what we learn is that all
21 films of this type behave in general that way,

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1 and that all high-Z filters in general behave¹⁴⁷
2 that way. The specific ones: that analysis
3 has been done by Landauer, and we have been --
4 it was sort of the question, are we accepting
5 their analysis.

6 I don't know what we would gain by
7 going back and running -- basically, we're
8 talking about exposing film of that type with
9 known filters, and sort of confirming what
10 Landauer has done.

11 Well, they have a certified
12 dosimetry program. It has been certified for
13 years independently by national dosimetry
14 certification bodies, and I think we're simply
15 saying that we are accepting those values,
16 that they have the ability to make that
17 distinction.

18 I would also add that my
19 confirmation of the -- of the filters just
20 occurred over this weekend for my own
21 satisfaction. So, it's not like I had a

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1 report in advance to issue. I simply wanted¹⁴⁸
2 to confirm that Landauer did not use different
3 types of badges for different -- for different
4 customers.

5 They all had -- every customer had
6 these same filters and these same film
7 packets. So, that's the only comment I would
8 make on that.

9 DR. MCKEEL: Well, I would like to
10 make this comment in response. This is Dan
11 McKeel again.

12 CHAIRMAN ZIEMER: Sure.

13 DR. MCKEEL: I believe that
14 actually, just for the record, everybody needs
15 to understand that, before I contacted
16 Landauer on my own and found out that they had
17 film badges, some film badges for some people
18 at GSI, nobody on the Board, SC&A or NIOSH had
19 any inkling that this was true.

20 I have letters dating back to 2005
21 from then-OCAS director Larry Elliott, who

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1 said, no, there was no film badge data at all
2 for General Steel Industries. And I'd also
3 like to put on the record that it was I, not
4 anybody else, that brought up the issue of
5 film badge sensitivity because it hadn't been
6 discussed before. It hadn't been analyzed
7 before.

8 And so, you know I brought it up. I
9 brought it up at the September 20th meeting,
10 and Dr. Neton said, well, we've already
11 analyzed that. And so, we will bring forth
12 that report.

13 So, in a fairly short while, I did
14 get a report on -- from Dr. Macievic's paper,
15 and it was dated August 2010. So, I thought,
16 gee, that's kind of strange. So, it was done
17 in August of 2010, and it's just being
18 circulated in November of 2011.

19 So, the next day, I have an email
20 from Josh Kinman, I believe, that says, oh,
21 that report I sent you yesterday was -- the

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1 date was in error. And so, there's a ^{new}₁₅₀
2 report attached, a date-corrected report,
3 that says October of 2011.

4 So, anyway -- I mean August of
5 2011. Excuse me. So, I just don't know. My
6 own opinion is, despite what Paul just said,
7 it's that if Landauer is supposed to have
8 total credibility, then they should know, they
9 should have in their records exactly what kind
10 of film badges they supplied to General Steel
11 Industries, including the types of film.

12 And I too have been to the ORAU
13 museum website, and seen the fact that
14 Landauer has at least, at least three
15 different kinds of film badges shown on those
16 pages. So, to say that they -- you know, they
17 didn't just issue one kind of film badge and
18 one kind of film, that's not true.

19 MR. DELL: Comment please.

20 CHAIRMAN ZIEMER: Are you done, Dr.
21 McKeel?

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1 DR. MCKEEL: Yes. 151

2 CHAIRMAN ZIEMER: Okay, who else
3 was commenting?

4 MR. DELL: I have a comment. When
5 I first started at General Steel in '56, I
6 don't know what was in the film badge, but it
7 was a different shape, a larger film badge,
8 than what I had in '68 and '70. There was a
9 difference there.

10 CHAIRMAN ZIEMER: Yes, I think
11 we're aware of that. In fact --

12 MR. DELL: And then there was one
13 other thing. The dosimeters, you guys get
14 real technical. I'll tell you how technical
15 General Steel was. Every day, we calibrated
16 the dosimeter and took the reading on it at
17 the end of the day and wrote it down. The
18 next day, we recalibrated.

19 We didn't send it in and out. That
20 was the use of the dosimeter.

21 CHAIRMAN ZIEMER: Those are the --

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1 those are the pocket dosimeters, I believe. 152

2 MR. DELL: Yes.

3 CHAIRMAN ZIEMER: Right. Yes,
4 actually we agree that, prior to Landauer,
5 there probably was a different supplier. Dr.
6 Anigstein suggested it might've been a
7 Tracerlab badge. I think there was a picture.
8 I don't know if it's available to you. It's
9 in the report. Maybe Dr. McKeel --

10 MR. DELL: I saw it, and it's a
11 larger badge than what we had in the later
12 years.

13 CHAIRMAN ZIEMER: Right. It's
14 larger than the Landauer badge.

15 MR. DELL: Yes.

16 CHAIRMAN ZIEMER: Right. It had a
17 larger opening. That's the one that I was
18 referring to. It might've been a Tracerlab.
19 We're not sure on that. Thank you for that
20 input. That's also helpful.

21 MR. RAMSPOTT: Dr. Ziemer, this is

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1 John Ramspott. 153

2 CHAIRMAN ZIEMER: Yes, John.

3 MR. RAMSPOTT: Can I make a
4 comment?

5 CHAIRMAN ZIEMER: You sure can.

6 MR. RAMSPOTT: I'm going to refer
7 back to Dr. Mauro and his statement earlier.
8 We're hearing a lot about film, and we're
9 hearing a lot about filters, and we're hearing
10 a lot of data. Your meeting did say it was
11 going to be kind of the early years.

12 CHAIRMAN ZIEMER: Right.

13 MR. RAMSPOTT: To go on the record,
14 you have no film. You have no filter, and you
15 have no data. You have no badges prior to, I
16 believe, '64 or late '63.

17 CHAIRMAN ZIEMER: I think that is
18 correct.

19 MR. RAMSPOTT: Now, everything else
20 is hypothetical, would be, maybe. And then I
21 go back to the ORAU website, and it's easy

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1 Google search, ORAU radiation badges. And when ¹⁵⁴
2 that website comes up, there's a button I
3 didn't hit until about two weeks ago.

4 It's called the info button. It's
5 right on the front page. When you click on
6 that, there's a chart on there that shows
7 everybody's badges, and what they're good for,
8 and what they can do. And Landauer gives
9 their accuracy rating on there.

10 CHAIRMAN ZIEMER: Right.

11 MR. RAMSPOTT: Anybody looked at
12 it? Do they know what the rating is? I'll
13 share it with you. Gamma 20 percent.

14 CHAIRMAN ZIEMER: Twenty percent,
15 yes.

16 MR. RAMSPOTT: Beta 20 percent.

17 CHAIRMAN ZIEMER: Right.

18 MR. RAMSPOTT: That means the badge
19 misses 80 percent, doesn't it?

20 CHAIRMAN ZIEMER: No, no.

21 MR. RAMSPOTT: What does it mean?

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1 CHAIRMAN ZIEMER: It's plus ^{or} 155
2 minus. For example, a reading of 10 might've
3 been 8 or 12.

4 MR. RAMSPOTT: Okay, but when you
5 add up all those readings at the end of a
6 month, wouldn't you still end up with missing
7 80 percent?

8 CHAIRMAN ZIEMER: No, no. For
9 example, if you had 10 readings of 10, that
10 would be 100.

11 MR. RAMSPOTT: Okay.

12 CHAIRMAN ZIEMER: The true value
13 might've been 120, or it might've been 80. It
14 might've been 80. In other words, it's a plus
15 or minus. It's an error -- it's an error
16 band.

17 It's like when you weigh yourself
18 on the scale, and if you weigh 200 pounds,
19 maybe you really weigh 201 or 199, or
20 something like that. How accurate is it?

21 MR. RAMSPOTT: I just saw the

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1 accuracy 20 percent, and I was trying to
2 figure that out.

3 CHAIRMAN ZIEMER: Yes, it's a plus
4 or minus value.

5 MR. RAMSPOTT: Okay, then I'm just
6 going to defer back to my point.

7 CHAIRMAN ZIEMER: Okay.

8 MR. RAMSPOTT: No badges --

9 CHAIRMAN ZIEMER: No, you're right.
10 We're aware. The early period -- well, I
11 think we're not necessarily saying no badges.
12 We're saying we don't have records.

13 MR. RAMSPOTT: Well, yes.

14 CHAIRMAN ZIEMER: Yes.

15 MR. RAMSPOTT: That's a valid
16 point.

17 CHAIRMAN ZIEMER: We think there
18 were badges. We have a photograph. We have
19 worker testimony that tells us there were
20 badges.

21 MR. RAMSPOTT: We don't know if

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1 that guy wearing that badge got toasted, ^{do} 157
2 we?

3 CHAIRMAN ZIEMER: We only know --

4 MR. RAMSPOTT: We don't have any
5 reports, do we?

6 CHAIRMAN ZIEMER: We don't. That's
7 exactly right.

8 MEMBER BEACH: Paul, I have a
9 comment. I know it is close to the lunch
10 hour. Just in keeping with the matrix, we're
11 talking about issue number 4, and I think I
12 heard Bob's comment, was that he recommends or
13 SC&A recommends that we rest this issue, which
14 would be close that issue. Is that correct?

15 CHAIRMAN ZIEMER: For film badges?

16 MEMBER BEACH: Film badges.

17 DR. ANIGSTEIN: What is Issue 4?

18 DR. NETON: In response to film
19 badges at high energy.

20 DR. ANIGSTEIN: Yes. No -- yes.

21 No, I think we're completely satisfied. This

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1 is one of the easier -- easier things ^{to} ~~to~~
2 resolve, that we're completely satisfied that
3 the film badges are responsive -- if anything,
4 over-responsive to high energies, and just to
5 echo Dr. Ziemer's comment in response to Dr.
6 McKeel about the different types of film
7 badges, it would be inappropriate, let's say,
8 to do a calibration of dose versus film
9 density on one type of film and apply it to
10 another.

11 But as long as the calibration,
12 which is done on every batch of film that is
13 used by Landauer, and for that particular type
14 of film for all the workers, then the
15 calibration is valid. And as far as a
16 question of, well, we had several types of
17 film. There were two types of -- three or
18 four.

19 We had two types of film in the Los
20 Alamos report. There were two other types of
21 film in the two sources cited by Greg

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1 Macievic, and they all -- the details are
2 slightly different, but they all have the same
3 general shape. They over-respond. The
4 response going up after 1 MeV, and they over-
5 respond, and this is understandable because
6 all film is composed primarily of silver
7 bromide. Slightly different mixes in the
8 emulsion, slightly different other chemicals
9 added, but it's the basic film.

10 The basic thing is if you put
11 energy into the film, you're going to get a
12 response in terms of -- after the film is
13 developed in terms of density. So, again, the
14 type of filter, the thickness of the filter,
15 would be -- would make a quantitative
16 fractional difference.

17 The number would be slightly
18 different. There would be an over-response by
19 a certain percentage, over by a slightly
20 different percentage. But the general physics
21 does not change.

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1 CHAIRMAN ZIEMER: I think your ¹⁶⁰
2 point is on the money, Josie. That would
3 appear to close that particular issue. We're
4 trying to focus today on the early years, and
5 this is outside the early years, but it came
6 up in part because of the question whether
7 film badges were in use prior to this period
8 or not. And somehow we got into what badges
9 were used and when, but if the -- if the Work
10 Group is agreeable, we would agree to close
11 that issue. Any objection to that?

12 MEMBER MUNN: Not at all, no.

13 CHAIRMAN ZIEMER: But after lunch,
14 we want to come back to the main issue of the
15 SEC itself in the early years, and evaluate
16 where we are. So, we're going to take a one-
17 hour break for lunch, and then we'll return at
18 ten after one.

19 (Whereupon, the above-entitled
20 matter went off the record at 12:09 p.m. and
21 resumed at 1:23 p.m.)

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1 MR. KATZ: Let me just check before ¹⁶¹
2 we get started on the line for Dr. Poston.
3 Are you on the line with us? No, okay.

4 CHAIRMAN ZIEMER: Petitioners still
5 on the line?

6 MR. KATZ: Petitioners on the line?

7 DR. MCKEEL: Yes, this is Dan
8 McKeel.

9 CHAIRMAN ZIEMER: Yes, okay.

10 MR. KATZ: Okay.

11 CHAIRMAN ZIEMER: Okay, we want to
12 focus on item 5 on the agenda now,
13 consideration of the question of whether or
14 not NIOSH model will bound doses with
15 sufficient accuracy in the early years. The
16 focus here is primarily on the -- what we
17 might call the radium period. This is pre -
18 cobalt-60, pre-iridium, pretty much pre-film
19 badge records. So, we have some -- some
20 record that lapses --

21 DR. ANIGSTEIN: Right, except for -

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1 - you know two things about the film badges,¹⁶²
2 One is one worker's film badge record, and
3 also the statement of the AEC application.

4 CHAIRMAN ZIEMER: Right.

5 DR. ANIGSTEIN: For all of the
6 years they'd been using radium, you never
7 exceed -- no one exceeded the AEC, the then
8 existing AEC regulations.

9 CHAIRMAN ZIEMER: Right. So, there
10 are those records. But just to focus on this
11 because we talked about before, separating
12 these periods in terms of thinking about the
13 SEC, and we were going to consider the issue
14 of whether there might be an SEC identified
15 for the earlier period.

16 So, I have indicated here we want
17 to give NIOSH an opportunity to reiterate
18 their position, and make any comments they
19 want on the early period to have SC&A
20 reiterate their position, and any comments on
21 the early period, and we can consider them

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1 whether or not the Work Group wishes to make a¹⁶³
2 recommendation to the full Board on that early
3 period.

4 And let me also add that if we
5 don't make a recommendation, that doesn't
6 preclude us doing it at some other point if
7 you may feel like you're not prepared to make
8 a recommendation one way or the other right
9 now. But at least we want to address that
10 question.

11 Let me ask Dave Allen to start for
12 NIOSH.

13 MR. ALLEN: Well, the White Paper
14 we sent out last -- I wouldn't even call it a
15 couple months ago. It was last -- we
16 discussed it in the last Work Group meeting.
17 The White Paper included during the radium era
18 an estimated dose radiography items out in the
19 plant, including people breaking the barrier
20 and walking through.

21 It also included a similar estimate

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1 for the cobalt era for radiography out in the ¹⁶⁴
2 plant, as well as cobalt radiography inside
3 the -- what I call the radiography room in --

4 CHAIRMAN ZIEMER: Building 6, yes.

5 MR. ALLEN: What it did not include
6 is the -- an estimate for the radium
7 radiography inside of the radiography room. We
8 didn't think it exists. We thought they built
9 that for the cobalt era.

10 CHAIRMAN ZIEMER: But we have
11 worker testimony now indicating it was there
12 during the radium era as well.

13 MR. ALLEN: Yes. So, the White
14 Paper version should be revised to include an
15 estimate for radium radiography inside the
16 radiography room, and the intent of the White
17 Paper was to try to estimate all the major
18 sources, and to -- essentially we were
19 intending to take the highest one for each era
20 to be the bounding case.

21 So, I think we have to include that

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1 radiography inside the radiography room if ¹⁶⁵ the
2 radiography out in the plant is higher than
3 that, we --

4 CHAIRMAN ZIEMER: You have to see
5 what it is in the radiography -- or in the
6 building 6 area as well.

7 MR. ALLEN: Right.

8 CHAIRMAN ZIEMER: You would have to
9 do that yet.

10 MR. ALLEN: Yes.

11 CHAIRMAN ZIEMER: But in terms of
12 doing that, your methodology would be similar
13 in terms of putting the source in the room,
14 calculating doses into the -- into the control
15 office and at the door and outside the room, I
16 assume. Right?

17 MR. ALLEN: Yes, we would probably
18 start with a similar approach that we'd used
19 for the cobalt and then modify it for the
20 different source.

21 CHAIRMAN ZIEMER: Difference in the

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1 gamma. 166

2 MR. ALLEN: And the gamma. They
3 added some shielding when they went to the
4 cobalt.

5 CHAIRMAN ZIEMER: Which they didn't
6 have during the radium era.

7 MR. ALLEN: Right.

8 CHAIRMAN ZIEMER: Okay.

9 MR. ALLEN: So, the intent would be
10 to start with the same approach, and modify it
11 for the appropriate conditions. The only
12 other change I can think of on there is that
13 the St. Louis Testing: we did not know the
14 time frame that they were operating. It was
15 not the limiting factor prior to '62, but it
16 was after. Now it's looking more like it was
17 around 1964 when they started working. So, we
18 might have to break it up into three periods.

19 CHAIRMAN ZIEMER: You had some St.
20 Louis Testing dose assigned to the early
21 period originally. Is that correct?

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1 MR. ALLEN: It was one of the ¹⁶⁷
2 models that we modeled the St. Louis Testing
3 and said it could've been any of the covered
4 period. It was not limiting -- it was not the
5 bounding dose until after '62.

6 CHAIRMAN ZIEMER: Right.

7 MR. ALLEN: So, I think now I would
8 have to say after '64, and have a different
9 dose between '62 and '64.

10 CHAIRMAN ZIEMER: Thank you.

11 DR. ANIGSTEIN: Late '64 apparently
12 they came in, judging just because of the
13 names of who he dealt with.

14 MR. ALLEN: Okay.

15 DR. ANIGSTEIN: It sounded like
16 late '64.

17 CHAIRMAN ZIEMER: Okay, but NIOSH's
18 position is that they can reconstruct dose in
19 the early period, including dose resulting
20 from individuals walking through roped-off
21 areas?

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1 MR. ALLEN: Yes. 168

2 CHAIRMAN ZIEMER: Thank you. Now,
3 Bob, do you want to summarize for SC&A, and
4 what is SC&A's position on that issue and any
5 related comments?

6 DR. ANIGSTEIN: Yes. I put on the
7 screen the one sort of summary chart on the
8 radium exposure, and I think that this is a --
9 I think this is a call the Board will have to
10 make in terms of we have one report -- I mean
11 a report of one incident, and the remarkable
12 thing about that report is it's always
13 attributed to someone else at a different
14 time.

15 Someone heard it from someone that
16 this radium source was taken, and the
17 circumstances differ from account to account,
18 and they differ as to how it was recovered,
19 and to where it was taken, and where it was
20 found.

21 So, there is a -- what I would do

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1 if I was putting another bullet item, I would¹⁶⁹
2 say incident of stolen or mistakenly taken
3 radium source, with a big question mark after
4 it.

5 MR. KATZ: I'm sorry, Bob. Can I
6 just interrupt you a second because, although
7 it's not interfering with us, I don't know
8 that it's not interfering with people on the
9 line.

10 Someone on the phone has a phone
11 open and a number being dialed in. Whoever
12 that is, you need to mute your phone, because
13 I think everyone else on the phone is
14 listening to an incoming phone call. Okay, I
15 don't hear anything now.

16 CHAIRMAN ZIEMER: Okay, thanks.

17 MR. KATZ: Sorry.

18 DR. ANIGSTEIN: So, there may have
19 been such an incident. We don't really -- the
20 accounts have been different. Two accounts
21 are similar, but again one is from the

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1 recently deceased supervisor who described his
2 colleague, named on the application, slightly
3 senior person, who actually went up in an
4 airplane with a Geiger counter was described.

5 The question is, can you really
6 detect the radium. They have -- radium
7 sources with Geiger counter flying in an
8 airplane, which I guess has, well, probably a
9 minimum speed of 100 miles an hour. I don't
10 think --

11 CHAIRMAN ZIEMER: But if someone --
12 let's assume that the event happened. I think
13 there's reason to think it probably happened,
14 but if the individual who had that exposure
15 made a claim, and indicated that they were
16 involved in that, that would be accounted for
17 just as the case where the site -- where the
18 betatron was turned on inappropriately when
19 someone was in the room.

20 That person's dose could be taken
21 care of.

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1 DR. ANIGSTEIN: And that -- it's
2 not inappropriate for me to say I checked that
3 person's dose, and there was nothing on his
4 film badge.

5 MR. ALLEN: Which incident are
6 we're talking --

7 DR. ANIGSTEIN: The gentleman who
8 was on the phone this morning said that the
9 betatron would turn on when he was in the
10 room. This was during the period --

11 CHAIRMAN ZIEMER: Well, I don't
12 know whether it's the same person, or --

13 DR. ANIGSTEIN: No, it is the same
14 person.

15 CHAIRMAN ZIEMER: We don't want to
16 get into that, but in the case of an alleged
17 event, NIOSH does add that into that
18 individual's dose.

19 DR. ANIGSTEIN: Okay.

20 CHAIRMAN ZIEMER: If they say they
21 were in -- if there's pretty good reason to

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1 think that a person took that source home¹⁷²
2 they will reconstruct that dose because --

3 DR. ANIGSTEIN: The only other
4 thing -- the only other thing about the
5 incident, general conclusion, is it does
6 indicate lax -- I mean, having been a
7 radiation safety officer myself at one time --
8 I wasn't a certified health physicist, the
9 first thing you do is maintain security over
10 your sources.

11 I mean you don't need very much
12 training to know you put things under lock and
13 key. So, if they didn't do that, that does
14 indicate some laxity during the period let's
15 say pre '57.

16 CHAIRMAN ZIEMER: That's probably
17 when they put locks on the doors apparently.

18 DR. ANIGSTEIN: Yes, right, because
19 one radiographer said that when he came back
20 to work in '56 or maybe '57, there was a lock
21 on the door, which hadn't been there before.

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1 So, that -- because of that. Someone else said¹⁷³
2 the same thing: they put a lock on the door
3 after the source was taken.

4 So, there is some question, and I'm
5 not being concise and to the point. So,
6 first, let's say '53, '54, '55, '56, were the
7 controls really adequate? Well, they didn't
8 have a lock on the door. That's the one thing
9 we know. There was at least one incident.

10 Whether that just -- they just
11 didn't happen to think anyone could walk in
12 and take the source out of the lead shield --
13 I mean they normally -- there were two
14 possibilities in my mind. Normally, the
15 source was kept in the lead shield with a
16 string attached to it, so that you can lift it
17 out with a fish pole. That's a little far
18 fetched to say, oh, here is a big lead shield.
19 Here is a string. Let me see what's at the
20 end of that string.

21 The other possibility is there was

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1 an exposure being made, and it was left¹⁷⁴
2 unattended, and with no lock on the door,
3 radiographer goes away to get film or have
4 lunch or whatever, and somebody walks in and
5 sees this shiny little brass plumb-bob sitting
6 there in the middle of the room, doesn't
7 realize that there is a casting there. Doesn't
8 realize that there is film, and just picks it
9 up and walks off with it.

10 Maybe. Or maybe it was being done
11 elsewhere in the plant where occasionally it
12 got -- and then it would just -- apparently,
13 they put it on something like a golf tee, like
14 a little cup, and it just sits there. You
15 don't leave it on the string then.

16 CHAIRMAN ZIEMER: Right.

17 DR. ANIGSTEIN: The string is
18 attached to it so that you can retrieve it.
19 And so, it's conceivable that somebody saw it
20 and didn't know what was going on, and took
21 it. You know, it's --

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1 CHAIRMAN ZIEMER: So, that may ^{or} ~~175~~
2 may not have been related to locks on the
3 doors because if it was out --

4 DR. ANIGSTEIN: They wouldn't have
5 done it anyway, but they may have just --

6 CHAIRMAN ZIEMER: Right.

7 DR. ANIGSTEIN: So, the answer is,
8 who knows what was going on? From the -- from
9 '57 on, it seems like at least according to
10 the testimony of one worker, that they had
11 some decent controls. And furthermore,
12 regardless of how careful -- you know, whether
13 they controlled everything, the fact that --
14 oops, got locked out again.

15 Unless we believe that they --
16 unless we believe -- I'm going to put it in
17 extreme terms. Unless we believe that GSI was
18 a criminal enterprise and deliberately
19 perjured themselves, I think it's a criminal
20 act to submit an application to a government
21 agency with material false statements.

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1 And unless they deliberately¹⁷⁸
2 perjured themselves and directly lied and
3 deliberately falsified records, they did in
4 fact go with -- stick with the AEC limits.
5 They're pretty high. I mean if I was a
6 radiation safety officer supervisor, I
7 wouldn't brag about the fact that somebody got
8 15 rem in a year.

9 MEMBER MUNN: No.

10 DR. ANIGSTEIN: But nevertheless,
11 they said basically during '54, '53, it
12 would've been under 15, and after '55, under
13 12. Twelve point five, unless I made an error
14 somehow.

15 CHAIRMAN ZIEMER: Well, keep in
16 mind the ALARA concept wasn't really being
17 utilized in the '50s in most places. There
18 was not a lifetime dose limit.

19 MEMBER MUNN: No.

20 CHAIRMAN ZIEMER: It was quarterly
21 and annual limits, and in fact, though it is

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1 not mentioned here, the quarterly limit at ~~one~~
2 time was a sliding limit. It was 3 rems in
3 any 13 weeks, and it wasn't calendar quarters.

4 The NRC specifically changed it to
5 calendar quarters because it was very hard to
6 administer a sliding calendar quarter.

7 MEMBER MUNN: As Bob points out,
8 although it's nothing to be very pleased with,
9 nevertheless --

10 CHAIRMAN ZIEMER: The goal was to
11 stay below the limit. Now it is to be as low
12 as reasonably achievable. But that's a
13 different mind set.

14 DR. ANIGSTEIN: And they all but --
15 they implicitly admitted that there were
16 instances where people reached the limit
17 because otherwise they said no one exceeded
18 the limit. If no one exceeded half the limit,
19 they would trumpet that.

20 MEMBER MUNN: Of course.

21 DR. ANIGSTEIN: So, they couldn't

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1 have had high doses, and again the -- and the ¹⁷⁸
2 second thing, whether you agree -- Dave and I
3 may disagree about how long the fishing pole
4 was, or how long the -- how long they held it,
5 but the fact that this one radiographer gave
6 us his -- gave us his report and it comes out
7 to two rem per year, 2 R per year -- they call
8 it rem I think.

9 So, 2 rem per year, and he only
10 worked weekends. That falls right -- so,
11 these two numbers, this falls right in the
12 middle of this range. So, I would go with
13 this, with these numbers, as being plausible
14 upper bounds based on some information,
15 documented information, certainly claimant-
16 favorable.

17 And yet, it is a number. It's not
18 like we can't reconstruct the dose. Now, the
19 doses to the non-radiographers I think that's
20 a little -- little hazier because of the mere
21 fact that they weren't badged.

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1 So, here is just an example
2 scenario that they spent, according to the
3 nuclear consultant survey, this was -- no, I'm
4 sorry. According to our calculation, this is
5 the dose rate with both radium sources in use,
6 and according to the NCC survey, they would
7 give a plausible occupancy of 25 percent,
8 which seems reasonable.

9 I mean, no worker was stationed out
10 there at a guard duty station outside that
11 door. He gave it for outside the wall, but I
12 put him outside the door because that's the
13 least shielded location.

14 CHAIRMAN ZIEMER: Now, we've had
15 worker testimony in this last round here that
16 indicates that the one-and-a-half times the
17 limit distance was in fact used. That was the
18 question we had early on.

19 DR. ANIGSTEIN: Yes, but that
20 wouldn't apply to this building, see.

21 CHAIRMAN ZIEMER: But it could

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1 apply to the radium used out in -- 180

2 DR. ANIGSTEIN: Outside, yes. But
3 that would've given an even lower dose.

4 CHAIRMAN ZIEMER: But that also has
5 implications for the non-radiographers in
6 terms of where the boundary was.

7 DR. ANIGSTEIN: Right.

8 CHAIRMAN ZIEMER: And then if you
9 allow for the fact that they may walk across,
10 and I think both of you have constructed how -
11 -

12 CHAIRMAN ZIEMER: Right.

13 MR. ALLEN: I don't think we're
14 very far apart there. They're both smaller.
15 They're both kind of a small dose if I
16 remember.

17 DR. ANIGSTEIN: Well, this is a
18 little higher than that boundary dose because
19 the actual -- the actual exposure rate -- see,
20 this already takes the 25 percent into
21 account. The actual exposure rate there is

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1 8.6 mR per hour. Then I take the number ~~181~~^{of}
2 hours, multiply by 30 percent, and multiply by
3 the 25 percent --

4 CHAIRMAN ZIEMER: That's separate
5 from this roped-off area.

6 DR. ANIGSTEIN: Yes, but I'm saying
7 this is the limiting --

8 CHAIRMAN ZIEMER: That's much
9 higher, yes.

10 DR. ANIGSTEIN: So, if the
11 radiographer is done there, you actually get a
12 higher exposure than if you assume that it was
13 done in the plant. Can't be done in both
14 places because I'm assuming again one curie.
15 So, two sources are there.

16 CHAIRMAN ZIEMER: Which also is
17 probably unlikely.

18 DR. ANIGSTEIN: Yes. Again, it's a
19 limiting case.

20 CHAIRMAN ZIEMER: Right.

21 DR. ANIGSTEIN: But then you can

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1 say one source is here. One source ^{is} ~~is~~
2 outside. It's a simple --

3 CHAIRMAN ZIEMER: It's an upper
4 bound.

5 DR. ANIGSTEIN: Exactly. Exactly,
6 and that's all we're looking for. We're not
7 looking for realistic, exact.

8 CHAIRMAN ZIEMER: Let's see if
9 Board Members have comments or questions. The
10 other pieces of information that we have
11 gained since our last meeting on this early
12 period: one is the confirmation that film
13 badges were used. We don't have the film
14 badge numbers. Well, we have one set of
15 numbers based on that one individual.

16 DR. ANIGSTEIN: Right.

17 CHAIRMAN ZIEMER: But the actual
18 fact that film badges were used tells us
19 something about the fact that there was a
20 radiation protection program in use because
21 that was one of the questions. Loose cannons

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1 just doing this without any protection¹⁸³
2 program; obviously there were some concerns
3 that we've heard today about the -- sort of
4 the adherence to safety programs, leaving
5 things unattended and so on, but we also know
6 that we can account for doses of people who
7 traversed the boundaries.

8 So, the film badge program is one
9 issue. The confirmation that there was a
10 practice of roping off the area to the one-
11 and-a-half times the 2 mR distance, 2 mR per
12 hour distance, is another indication of a --
13 of the presence of a somewhat formalized
14 radiation protection program.

15 So, we have those additional pieces
16 of information that we didn't really have well
17 established at our last meeting. But so I want
18 us to keep that in mind. So, we have sort of
19 several pieces of information that some --
20 some better information on practices, and some
21 -- well, I guess it's better information on

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1 the practices. 184

2 We know we're focusing on the
3 radium sources. We have the additional
4 information of the presence of the use of the
5 sources in building 6, as --

6 DR. ANIGSTEIN: And this is -- what
7 I'm showing on the screen is during what I
8 call the radium era.

9 CHAIRMAN ZIEMER: Which is?

10 DR. ANIGSTEIN: Which is prior to -
11 - so, here the date on this thing is pre 1962.
12 That's when they filed the application.

13 CHAIRMAN ZIEMER: Right, and is
14 this -- this is the AEC form that gives the
15 occupational exposure.

16 DR. ANIGSTEIN: Right.

17 CHAIRMAN ZIEMER: Part of which for
18 this person was at Pittsburgh Testing Company.

19 DR. ANIGSTEIN: That was earlier.

20 CHAIRMAN ZIEMER: And then the
21 rest, the 18 quarters that we're referring to,

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1 are General Steel Industries, '53 up to -- 185

2 DR. ANIGSTEIN: Yes, but in reality
3 it wasn't doing radiography. He was employed
4 there in '53, but he was -- the 18 quarters --
5 you see, the 18 quarters would have been prior
6 to December 31st, 1961.

7 CHAIRMAN ZIEMER: Right,
8 understood.

9 DR. ANIGSTEIN: So, therefore if
10 you do that, it starts in the middle of '57.

11 CHAIRMAN ZIEMER: Right.

12 DR. ANIGSTEIN: Right. Which is
13 consistent with his account.

14 CHAIRMAN ZIEMER: But they are
15 accounting for everything from the time he
16 started working, whether he actually worked
17 with radioisotopes or not in '53.

18 DR. ANIGSTEIN: Well, but they say
19 18 quarters.

20 CHAIRMAN ZIEMER: Right.

21 DR. ANIGSTEIN: So, that would only

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1 be --

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2 CHAIRMAN ZIEMER: It's part of
3 that.

4 DR. ANIGSTEIN: They put is -- this
5 is when his initial employment -- but the 18
6 quarters on this you assume they were
7 discontinuous, but I assumed they were
8 continuous. Would've started in the middle of
9 '57.

10 CHAIRMAN ZIEMER: Right.

11 DR. ANIGSTEIN: Which is entirely
12 consistent. He spent two years in the
13 service, so, mid '54 to mid '56. Came out,
14 went back to work, and then started doing
15 radiography in mid '57, if you assume that the
16 18 quarters end prior to '62.

17 CHAIRMAN ZIEMER: Right.

18 DR. ANIGSTEIN: Which is -- it's
19 not precisely what this individual said, but
20 it's entirely consistent with what he said.

21 CHAIRMAN ZIEMER: Yes, okay. Okay,

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1 Wanda, comments or questions? 187

2 MEMBER MUNN: Yes, two quick
3 comments. When they're talking about things
4 that we did not know before or things that
5 have been reassured in the meantime, we do now
6 know -- have been assured by the workers that
7 pencil dosimeters were widely in use.

8 CHAIRMAN ZIEMER: As well.

9 MEMBER MUNN: As well, which is
10 always comforting information to have.

11 CHAIRMAN ZIEMER: But we don't have
12 the records.

13 MEMBER MUNN: Even without the
14 records, the thought that they would be used
15 assures us that there were safety practices in
16 house at the time.

17 The other comment is simply to
18 reinforce what was said earlier with respect
19 to unusual incidents. Certainly an incident
20 of the type that we have discussed in
21 relationship to this case would pose enough of

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1 a stir both in the company and certainly ⁱⁿ ~~188~~
2 the employee's home that even his -- his
3 family certainly wouldn't have been aware that
4 such an occurrence had been factored in his
5 exposure.

6 So, it does not seem wise to be
7 putting undue amount of emphasis on that
8 incident as having been indicative of anything
9 other than an off-normal incident. It appears
10 to me that we can bound.

11 CHAIRMAN ZIEMER: Thank you. Josie?

12 MEMBER BEACH: I guess I'm on the
13 other end of things. I believe that this is
14 still an SEC issue for the early years, '53
15 through -- what is it, '63. While we have
16 more information, I still don't think we have
17 key things like the documentation, radiation
18 monitoring.

19 We have varying accounts of what
20 actually happened. We have varying accounts
21 on the men walking through the areas. We have

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1 two different models right now. While they're
2 close, they're still two different models.

3 So, at this time, I'm still leaning
4 towards SEC for those earlier years.

5 CHAIRMAN ZIEMER: Actually, the
6 issue of two different models per se is -- is
7 -- that's more of an issue of what assumptions
8 -- I think the modeling is very similar. It's
9 what assumptions like the length of the pole
10 and that sort of thing.

11 MEMBER BEACH: And maybe different
12 models wasn't correct. Differing concepts
13 maybe.

14 CHAIRMAN ZIEMER: Yes, but that's a
15 -- that's a bounding issue. I think the other
16 ones that you raise are the type that would --
17 one would consider for an SEC. You're sort of
18 getting at some levels of uncertainties that
19 you're uncomfortable with.

20 MEMBER BEACH: Correct.

21 CHAIRMAN ZIEMER: My personal

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1 feeling is -- for the early years is that ^{the}~~the~~
2 bounding models that have been proposed,
3 whether -- aside from the differences in the
4 assumptions on the length of poles and so on,
5 that -- and taking into account in the absence
6 of film badges and those other records, what
7 you won't have on the other employees in any
8 event, that -- the fact that we know the size
9 of those radium sources and -- you know, this
10 is one of those cases where, in my mind, it is
11 much easier to bound because we don't have a
12 complex system like we have in many labs with
13 multiple external, internal, daughter products
14 and all of these things.

15 We know the outputs of radium
16 sources. We know what doses you can get at
17 various distances. So, even had they had no
18 film badges and no dosimeters, in my mind, we
19 can reconstruct dose.

20 So, I'm comfortable in doing that
21 in the early years. I don't think that still

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1 necessarily precludes us from -- because ^{at}₁₉₁
2 this point, if we don't make a recommendation
3 for an SEC, we're not -- we haven't ruled it
4 out because there's some other issues that
5 still need to be closed.

6 I will still want to hear about --
7 I think some of us are satisfied with why we -
8 - why we are where we are with respect to
9 iridium, and the -- when did they start having
10 use the 80-curie sources and so on.

11 But there's actually conflicting
12 testimony from the workers on this, and it's
13 not like we're rejecting the workers. They're
14 not all agreeing on when these things were
15 there, and when they started.

16 We have some workers saying that no
17 -- in fact, one that was indicated to us as
18 being the person to pay attention to today,
19 telling us that the iridium was only from St.
20 Louis Testing. So, we -- there's some
21 conflicting testimony there.

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1 A lot of that may move us into the ¹⁹²
2 post '62 era because that's when the cobalt
3 sources also started to be used. But we have
4 what we have right now. We have the radium
5 part of the radiography.

6 We have the cobalt and the St.
7 Louis Testing stuff. We have all that. We
8 have yet to get the final modeling from NIOSH
9 for the betatrons, and we have coming to us in
10 December the exposure model for the old and
11 new betatrons, the air activation model, the
12 model for the uranium activities, the steel
13 activation from the betatron, and then
14 reconciling the dose estimates with the dose
15 records.

16 So, all of that is still coming in
17 December, and some of this could also impact
18 on the decisions here. Another thing, and I
19 haven't asked for a formal motion, but I've
20 heard I think two of us are leaning toward not
21 an SEC, one leaning toward. We haven't heard

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1 from Poston or Mark, so they need ^{an}~~193~~
2 opportunity to weigh this stuff in as well.

3 My -- I think -- I was very hopeful
4 we would sort of be in a position to put this
5 part to rest now, but we do have two other
6 committee members who haven't weighed in,
7 number one, and again, I don't think it
8 precludes us, but it appears to me that it'll
9 be very difficult for us to make a
10 recommendation at the upcoming meeting.

11 The other two Members -- I assume
12 Mark and John have gotten all the documents.

13 MR. KATZ: Yes.

14 CHAIRMAN ZIEMER: I don't know if
15 John has because he's had some computer
16 problems in the transmittal of these. So,
17 that's also an issue.

18 DR. ANIGSTEIN: Mark, I think, only
19 got the redacted version because he was not --

20 MR. KATZ: Mark didn't -- I've sent
21 Mark the non-redacted version.

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1 DR. ANIGSTEIN: You did? 194

2 MR. KATZ: Yes, but Mark has been
3 sort of -- I need to speak to Mark because
4 Mark has really not been engaged in this Work
5 Group for quite a long time. Dr. Poston has
6 made some of these meetings or parts of these
7 meetings.

8 CHAIRMAN ZIEMER: Yes, so we need
9 to find out --

10 MR. KATZ: So, I need to speak to
11 Mark.

12 MEMBER MUNN: On where he is with
13 it.

14 MR. KATZ: On where he is with it,
15 I don't -- he hasn't come to meetings. He
16 hasn't participated by phone, and he hasn't
17 even responded to these materials I've been
18 sending to him in any way.

19 Now, I know he -- Mark cut back on
20 a number of Work Groups as he transitioned to
21 his new job. I don't know. It's unclear to

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1 me whether in this case of this Work Group
2 whether he intended to step back on this Work
3 Group as he did on some other Work Groups, or
4 just doesn't have the time to attend the
5 meetings.

6 But I will be speaking with Mark
7 about that. I know John Poston is still an
8 active member. That's clear to me. He hasn't
9 made this meeting, which he intended to make
10 at least intermittently today, but then he's
11 missed all this, and he needs to see not just
12 the materials that we've forwarded but he
13 needs to see the transcript of the discussion
14 today because I think it's an important
15 transcript. I think workers have said a lot
16 today on the record which is helpful, as well
17 as all of your discussions.

18 DR. ANIGSTEIN: He got the redacted
19 version of this -- of the presentation. I
20 took all the names out. I left other
21 identifying information.

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1 MR. KATZ: Right. Some materials¹⁹⁶
2 I've been sending him to another government
3 address he has, even though --

4 DR. ANIGSTEIN: I'm talking about
5 Poston now.

6 MR. KATZ: Oh, John Poston.

7 DR. ANIGSTEIN: Yes.

8 MR. KATZ: Right, and John Poston
9 has been limited because he hasn't had access
10 to his CDC account recently. So, right, he's
11 getting only material that is PA-cleared.

12 DR. ANIGSTEIN: I wouldn't call it
13 PA-cleared.

14 MR. KATZ: No, no, no. I know what
15 you're talking about. You're just --

16 DR. ANIGSTEIN: Presentation.

17 CHAIRMAN ZIEMER: All right, but
18 that's just leaving names out. That doesn't
19 per se affect the technical information in
20 there, I don't think.

21 MR. KATZ: Yes.

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1 CHAIRMAN ZIEMER: So, that ⁱⁿ₁₉₇
2 itself shouldn't be a barrier to --

3 MR. KATZ: Oh, no. I think John
4 can read the reports and carry on with that.

5 CHAIRMAN ZIEMER: Can -- the other
6 thing I think could be considered -- some of
7 these issues, for example whether or not the
8 80 curie source was there before '68, you
9 know, even if it was, does that affect the
10 modeling very much?

11 I think maybe you can look at that
12 data, or maybe you have already. You know, we
13 know how it models in after '68, and the
14 question would be, all right, let's suppose
15 for some weird reason which we can't figure
16 out -- it doesn't make sense really to me --
17 if it were there two years earlier, what does
18 that mean in terms of the model?

19 I think you can still -- you can
20 still bound with it. They changed the number
21 a little bit. I don't know if you'd say

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1 something similar to that on the -- 198

2 MR. ALLEN: Well, like you
3 mentioned with the conflicting information and
4 all that stuff, the one consistent piece of
5 information with the 80-curie source is that
6 it was used in the betatron building.

7 CHAIRMAN ZIEMER: Right.

8 MR. ALLEN: So, I could try to
9 include some analysis of that with --

10 CHAIRMAN ZIEMER: With the
11 betatrons when you do the rest of that
12 analysis. The other thing I would mention is
13 if there were an iridium source, and again,
14 that is one of those conflicting things, but
15 it -- and the one license obviously does allow
16 them to use iridium instead of cobalt.

17 DR. ANIGSTEIN: That was in '72.

18 CHAIRMAN ZIEMER: Yes, it's later
19 here, but suppose that were the case, the --
20 the bounding value probably changes very
21 little whether you use iridium or cobalt.

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1 DR. ANIGSTEIN: It's the opposite,¹⁹⁹
2 It's much less.

3 CHAIRMAN ZIEMER: I would think it
4 would be less. If you use iridium -- whether
5 you use iridium or cobalt as far as the film,
6 you've got to get the same dose to the film to
7 get the image.

8 Now, you may have to leave the
9 iridium source out a little longer to do that,
10 so that -- but my intuitive -- but you could
11 verify this readily.

12 DR. ANIGSTEIN: But if the -- the
13 scattered radiation, nobody stands there in
14 front of the source.

15 CHAIRMAN ZIEMER: No.

16 DR. ANIGSTEIN: So, for the
17 scattered radiation or penetrating through the
18 shield, there's going to be much less than
19 with cobalt --

20 CHAIRMAN ZIEMER: Yes, because the
21 spectrum is lower energy. So, just be

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1 cognizant of that. I don't -- I don't think²⁰⁰
2 we gain much by having a great deal of
3 argument about exactly when the sources came
4 there. If they were there earlier, what would
5 it look like? And my -- I don't think it's
6 going to change it very much. That's the only
7 point I'm going to make.

8 DR. ANIGSTEIN: The only exposure
9 scenario --

10 CHAIRMAN ZIEMER: Probably would be
11 less if you substituted the iridium for the
12 cobalt.

13 DR. ANIGSTEIN: The only exposure
14 scenario that you have with the 80-curie
15 cobalt is if somebody is on the unshielded
16 roof of the betatron building. That's a
17 higher dose than you even get from the
18 betatron.

19 CHAIRMAN ZIEMER: Yes, but they've
20 modeled that already, I think, and

21 MR. ALLEN: Bob modeled that.

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1 CHAIRMAN ZIEMER: All right, but 201

2 DR. ANIGSTEIN: Yes.

3 CHAIRMAN ZIEMER: But nonetheless,
4 it can be accounted for, if necessary. Okay,
5 let me also -- I want to give the petitioner
6 an opportunity to comment as well on all of
7 this that we've talked about here. Dr.
8 McKeel?

9 DR. ANIGSTEIN: And we also -- just
10 an addition here. In the AEC records, they --
11 when they did get the legal 80-curie source,
12 they did -- actually did a radiation survey
13 with the source, exposed source, in the
14 betatron.

15 CHAIRMAN ZIEMER: Right.

16 DR. ANIGSTEIN: And we have that
17 data.

18 CHAIRMAN ZIEMER: I have that
19 number, right. Okay, Dr. McKeel, are you on
20 the line? You had some comments.

21 DR. MCKEEL: Yes, I am on the line.

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1 CHAIRMAN ZIEMER: Do you have²⁰²
2 comments or questions at this point?

3 DR. MCKEEL: Just a few comments,
4 please. We have not heard from Dr. Mauro
5 today about his view of where things stand
6 versus the early SEC, and certainly at the
7 last meeting of this Work Group, he has made
8 impassioned arguments for an early-year SEC.

9 So, I would personally be very
10 interested in what he might have to say at
11 this point. I also would have to say that as
12 far as a vote on an SEC today, as much as I
13 would like to move this along, I do think it
14 is premature with two Board Members absent, as
15 you said, and also because whether you can
16 accurately bound the dose for the early years
17 is dependent on some facts.

18 I must disagree with you that it's
19 not important whether there was an iridium-192
20 source there because at least two people have
21 said that he was there during the 1950's. So,

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1 that replaces there in the early period, and
2 in that case, you would have to calculate a
3 dose for it, and consider that along with the
4 radium-226 dose.

5 And the other thing that I just
6 cannot really understand is, we heard today
7 Mr. Dell, Leroy, say without any equivocation
8 that he would go down to the 6 building area,
9 and from the betatron area, and to do that you
10 would have to pass through Buildings 10, 9,
11 you know, the intervening area into building
12 6.

13 And he said he was impressed that,
14 on this daily tour that he made, that you
15 would often find the small source out in the
16 plant being used. And on intense questioning
17 about this, by both the Board and SC&A, he
18 said that, no, that this could be anywhere in
19 the plant.

20 So -- and he estimated in fact that
21 90 percent of the time those smaller sources

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1 were used out in the plant. So, if we're ²⁰⁴
2 talking about an SEC, which as it stands right
3 now is for the whole GSI workforce, then all
4 of the previous comments that Dr. Mauro has
5 made, with which I have strongly agreed, that
6 you don't have any real data.

7 Yes, you know the strength of the
8 radium source. You do not know the strength
9 of the iridium source from GSI, which I argue
10 is still -- there's quite a bit of evidence
11 that it was there.

12 You don't know -- you might know
13 the strength of that, but you don't know how
14 long it was used, where it was used, how many
15 times it was used, how many people were
16 exposed to it when it was being used.

17 But what you do know from Mr. Dell,
18 which I think is powerful new testimony, is
19 that there were frequent violations of the
20 roped-off area, and as he told the story
21 today, you know, yes, he said a tape was

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1 always put up, actually one-and-a-half times²⁰⁵
2 the safe distance from the source. But he also
3 said right after that that people would walk
4 under that tape and go next to the -- go next
5 to the -- could walk within a foot of the
6 source and often did.

7 In other words, he's painting a
8 picture that people did what was convenient.
9 So, I just think the occupancy time of that
10 zone, and so forth, that they're not really
11 based on plausible assumptions.

12 I think that yes, some dose has
13 been calculated in there, but all the
14 assumptions were wrong. The assumptions were
15 that people -- I remember at the last meeting
16 that all during St. Louis Testing, the use of
17 their sources at GSI, somebody was always
18 around watching and surveilling.

19 Now we hear that when the GSI
20 sources were used out in the plant, frequently
21 nobody was watching them. So -- and when

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1 people say, oh, and most -- most is one of the ²⁰⁶
2 words I dislike in scientific quantitative
3 discussions. What does most mean? Does that
4 mean a majority? It really has no exact
5 meaning. That, most of the time the shots
6 were short.

7 Well, is that 98 percent of the
8 time, or 50 percent of the time? Who knows?
9 And so, there's a huge amount of uncertainty
10 about all these assumptions.

11 So, I guess the bottom line is
12 right at this moment I would appreciate
13 hearing Dr. Mauro's opinion. Of course, he
14 doesn't have to say that, but I would love to
15 hear what he has to say about things.

16 CHAIRMAN ZIEMER: Yes, actually I
17 would too, and I wasn't sure. John, are you
18 on the line?

19 DR. MAURO: Oh, yes. I've been on
20 the line all along.

21 CHAIRMAN ZIEMER: I thought maybe

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1 you would say something during the SC&A
207
2 portion but I didn't hear from you.

3 DR. MAURO: No, I was just
4 listening earlier when Mr. Dell -- I found Mr.
5 Dell's material to be the most pertinent in
6 just about everything that we discussed. Yes,
7 you know, you do come to a perspective, and I
8 do have a perspective.

9 What it looks like is we have a
10 time period starting in I guess around '53,
11 going up the end of the SEC period, which I
12 believe is '66.

13 CHAIRMAN ZIEMER: Yes.

14 DR. MAURO: The time period. And
15 I'm starting to think in terms of increments
16 of -- I call it elbows in our knowledge, or
17 how our knowledge changes regarding the level
18 of information we have, and how that bears on
19 with sufficient accuracy, reconstructing doses
20 with sufficient accuracy.

21 It seems to me starting around '62,

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1 '63 to the end of the SEC period, we have²⁰⁸
2 lot of regulatory controls. We have film
3 badge data. We have programs in place, which
4 argues toward the ability to reconstruct doses
5 fairly well. Then we have an interesting
6 period, which is I would say from '57 or '56,
7 up to '62, where we have information, and the
8 information goes toward the interviews, where
9 we have a little bit of conflicting
10 information regarding the degree of control
11 that there was over the radium sources, and
12 perhaps other sources.

13 We hear from Mr. Dell, and we also
14 heard from, I won't mention the name, but the
15 other person that was interviewed, where we
16 get information in one case that there was a
17 considerable amount of control. In another
18 case, there was some marginal or a lesser
19 degree of control.

20 So, if that -- and we also have
21 information, as Bob has explained, sort of

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1 like weight of evidence. We have information²⁰⁹
2 on at least one person's exposure records. We
3 also have information on the filing for the
4 application for the license, which argues
5 toward what types of exposures or experience.
6 That's where we heard about no one received
7 more than the radiation exposure limits, the
8 15 and 12 rem.

9 So, all of a sudden we have this
10 time period which starts to say that, well, we
11 have information for '56, '57. I'm not too
12 sure where the line is, but to '62, where
13 clearly there's a lesser degree of control
14 than we have for '62, but there is some degree
15 of control with some conflicting information.

16 This is an area that goes toward
17 weight of evidence in my mind, and it's a
18 tough call. Then we have the time period
19 before '56 to earlier. That time period seems
20 that we have very little information. We have
21 less information on the degree of controls

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1 that there might've been in place. 210

2 We have -- I guess from everything
3 I heard, I guess we have -- all we know is
4 that there were film badges. Other than that,
5 we have some information -- in other words, we
6 don't have the benefit of the knowledge that
7 was given to us around the '56 to '62 period
8 related to, for example, the 18-month
9 exposure, that 2 rem per year for that worker
10 regarding the testimony that there was
11 control.

12 I'll call him Mr. P testified that
13 yes, they did have good controls instituted
14 and managed in terms of barriers. But he,
15 that person, joined -- I believe, was active
16 in those types of activities and starting in
17 '56-'57 time period.

18 So, then I have this last time
19 period, from '52 to '56, which I'm a little
20 bit more troubled by in terms of having
21 adequate information to come to some judgment

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1 here. So, then of course we have this²¹¹
2 incident that may or may not have taken place,
3 and that was -- that happened also, it sounds
4 like if it did happen, it was in that '52, '53
5 to '56, '57 time frame.

6 And so, taking it all together, I
7 break it up into those three time segments,
8 and the one that gives me -- I am most
9 concerned with is the very early time period,
10 '52-'53, whenever the beginning is, '53, up to
11 about, let's say, '56. I'm feeling a little
12 bit better about being able to reconstruct
13 doses, although there's some concerns because
14 of conflicting information from, let's say,
15 '56-'57 up to '62.

16 Starting in '62, I feel as if
17 things -- you know, you got a good handle on
18 the problem. I guess that's the best I could
19 do. I wish I could have a stronger answer for
20 you, but that's my perspective.

21 DR. MCKEEL: I appreciate it very

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1 much. 212

2 CHAIRMAN ZIEMER: Thank you, John,
3 for those comments. Let's see if there's any
4 further input here in the people around the
5 table.

6 MR. RAMSPOTT: Dr. Ziemer, it's
7 John Ramspott.

8 CHAIRMAN ZIEMER: Yes, John.

9 MR. RAMSPOTT: I just want to
10 clarify one -- I think this is an easy point.
11 Mr. Leroy Dell, if he was still on the phone,
12 told myself and Terry Dutko without any doubt
13 that that plumb-bob was stolen out of 10
14 Building, not 6 Building, and that -- that was
15 one of those leave it alone, unsupervised
16 tests.

17 And it was a plumb-bob, which my
18 understanding was radium in plumb-bobs.

19 CHAIRMAN ZIEMER: Yes, that makes
20 more sense to me, too, John. It probably was
21 taken when it was out in use, rather than

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1 somebody going into the room where they stored²¹³
2 it and taking it out of its shield.

3 MR. RAMSPOTT: Mr. Dell knows the
4 individual that was actually the radiographer,
5 and the guy went to lunch. So, I mean if you
6 guys want to reinterview Mr. Dell to confirm
7 that, but Terry Dutko and myself had that
8 story told to us by Mr. Dell when we first met
9 him.

10 Another point is Mr. P's radiation
11 badge report, I guess I just heard that that
12 went back to '57, if I understand the 18
13 quarters. So, there's absolutely no badge
14 information prior to '57 for anybody, unless
15 I'm missing something.

16 CHAIRMAN ZIEMER: I think that's
17 correct. That's -- that matches what we have.

18 DR. ANIGSTEIN: That was correct
19 for Mr. P's badge. We back-calculate; we
20 simply count 18 quarters --

21 MR. RAMSPOTT: We have no reports

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1 from anybody -- 214

2 MR. KATZ: Hey, John, hold on one
3 second, please.

4 DR. ANIGSTEIN: John, wait. But
5 the other information is that they used film
6 badges from at least '53 on, because we have
7 the photograph, and the statement -- the
8 unqualified statement made by GSI on the AEC
9 application during all the time they used
10 radium, no one ever exceeded the AEC limits.

11 So, that was one of my suggested
12 limits was simply assume that the AEC limit is
13 the limiting dose, which is a very high dose,
14 by the way. Twelve rem or even up to 15 rem
15 in the early years is a very high dose.

16 MR. RAMSPOTT: Having the picture
17 and no badge reports is my point.

18 CHAIRMAN ZIEMER: Yes.

19 MR. RAMSPOTT: The picture is one
20 thing, but the actual reports: they do not
21 exist. So, essentially, there's no badge

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1 information for '57 to '53. 215

2 DR. ANIGSTEIN: Except the
3 statement based on badge information that
4 existed at the time, saying there was -- it
5 never exceeded AEC limits.

6 MR. RAMSPOTT: Know what, Bob? You
7 danced around a little bit today, but you were
8 talking about the legalities of a company
9 lying to the AEC. I read all over those
10 reports that there's not going to be any
11 isotopes out in the plant, too. So, I don't
12 know how anybody can believe, and it's in that
13 FOIA. If somebody is blatant, you got people
14 saying those things are out there in the
15 plant.

16 You got on the report it's not
17 going to happen that way, so I don't think I'd
18 believe anything they said.

19 DR. MCKEEL: Dr. Ziemer, this is
20 Dan McKeel. May I amplify that point, please?

21 CHAIRMAN ZIEMER: Sure, Dan.

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1 DR. MCKEEL: I am also extremely²¹⁶
2 distressed that there's a -- I would call it
3 kind of unquestioning acceptance that whatever
4 is written down in a license application is
5 true, and this includes the 1962 forward
6 safety, which has been referred to as
7 controls.

8 We know a lot more from various
9 workers that things that are written down as
10 ironclad procedures in the safety procedures
11 at GSI, drafted by Dr. Konneker, and NCC, that
12 those things simply never happened; for
13 example, that the crane operators in the
14 Building 6 radiography facility had to notify
15 the supervisor at -- before they were going to
16 come over that building.

17 We have testimony that that
18 actually never happened. And there are a lot
19 more things like that, and I can't go into all
20 of them today. I would be happy to do that.

21 But as a matter of fact, for

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1 everybody there, I would make the following²¹⁷
2 blanket statement. There is very little
3 corroboration, by either records or AEC
4 compliance reports, or anything that that
5 complete safety program that is outlined in
6 the 1962 license application, and repeated
7 over and over through into the 1970s, when
8 there was a major change in the safety
9 officer.

10 There's lots of evidence from
11 workers that those things never happened, and
12 there's almost no corroboration that they did
13 happen. The training program -- this is not
14 brought out today by Mr. Dell, but it is
15 important to say it. He said the training at
16 GSI was extremely poor, and I would say from
17 everything that I've learned that that's a
18 true statement.

19 And just as an example, which was
20 not brought out today, there was supposed to
21 be annual AEC testing of the radiographers at

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1 GSI, and as far as we know there is some ²¹⁸
2 testimony that ' identifying information
3 redacted', who is deceased, gave informal
4 talks about radiation safety before 1962.

5 We also have direct evidence from
6 Mr. Dell to John Ramspott, who related to me
7 that as a matter of fact, he was one of the
8 four people that he's aware of that ever took
9 a formal AEC radiation safety test, and he
10 took that test at Washington University.

11 It was given by Dr. Konneker. In
12 fact, he's the only living worker that we are
13 aware of that even acknowledges knowing Dr.
14 Konneker, but apparently, Leroy Dell knew him
15 and about him quite well.

16 But the salient point about the
17 radiation safety program quality at GSI is
18 that when Mr. Dell took his examination,
19 radiographer's exam, at Washington U under Dr.
20 Konneker, Bill Davis also took it, and two
21 other people took it as well. And all the

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1 other people flunked, including ' identifying²¹⁹
2 information redacted', who was the head safety
3 man in the later years after 1966, for
4 example, and had some part in radiation safety
5 very early on.

6 So, three of the chief folks who
7 ran the radiation safety flunked the test, did
8 not pass it, and only Mr. Dell passed the
9 test. That's not a good record for an in-
10 control, very well run radiation safety
11 program.

12 In fact, in most places, what
13 should happen is those people could not
14 continue in their jobs if they didn't pass the
15 qualifying test to be a certified
16 radiographer. And Mr. Dell mentioned this
17 morning that he was licensed but some of the
18 other people that did radiography were not
19 licensed.

20 So, I want to say, just from what
21 I've heard, that I do not believe the vast

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1 majority of what's written on paper, and you
2 can refer to it by various things, but I would
3 say, having been in the grants business
4 actively for -- including the Army, actually,
5 for 35 years, that people in all fields, many
6 fields, certainly medicine and certainly Army
7 research, put things in grants that may be
8 well intentioned at the time they are written,
9 but they just never get followed through on.
10 And some of the time, for practical reasons,
11 and sometimes because people never intended to
12 follow through on them.

13 And I'm suggesting that was the
14 situation largely at GSI, and I could go
15 through this in much larger detail, but I
16 would challenge anyone to go through the
17 radiation safety requirements that are written
18 down as formal things that need to be done
19 that -- about notifying ' identifying
20 information redacted', for instance, any time
21 there was going to be a shot done in the

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1 Building 6 facility. 221

2 That wasn't done. I mean it just
3 wasn't done. And so, I think just a -- sort
4 of a blanket acceptance that the controls were
5 really quite good, as has come out today just
6 does not square with the actual in practice
7 tax at GSI, and I just had to add that as a
8 postscript.

9 CHAIRMAN ZIEMER: Okay, thanks for
10 those additional comments, Dan. I do want to
11 make sure we understand that our assessment of
12 the sort of presence of a radiation safety
13 program in the early years is not dependent on
14 these documents per se, but more on the worker
15 testimony that there were film badges in use.
16 There were dosimeters in use, and there was a
17 practice of roping off the areas at one-and-a-
18 half times the 2 mR per hour distance.

19 So, we were understanding that as
20 there being the presence of a more formalized
21 radiation safety program. Now, whether it was

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1 effective or not I think you're quite right;
2 that is always a separate question. But I
3 don't think we're basing that on any
4 statements in these documents, but more on
5 testimony that has come out since our last
6 meeting, where we were trying to establish
7 sort of what the level of practice was, if
8 any, in those everyday.

9 So, I'm -- we know what was being
10 done. You always have the question of was it
11 effective in controlling the exposures. To
12 some extent, the modeling doesn't depend fully
13 on whether or not the workers were adhering to
14 things because we make certain assumptions.
15 For example, you're not supposed to walk
16 through a roped-off area. We're assuming
17 people did that on a regular basis in the
18 modeling.

19 So, there is an effort to take into
20 consideration the idea that good practices
21 were not necessarily always followed.

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1 DR. MCKEEL: This is Dan McKeel²²³
2 again. I certainly do understand that.

3 CHAIRMAN ZIEMER: Yes.

4 DR. MCKEEL: And my final comment
5 for the day is I made similar comments about
6 this at -- to the Board, but at Texas City --
7 but here's an example where there is one
8 report from one worker out of 3,000, Mr. P,
9 who worked at the site, left for the Army,
10 where there is one page that gives information
11 about 18 quarters' worth of radiation data.

12 There's no other data for that
13 period that everybody now seems to be quite
14 comfortable about, and actually it is basing a
15 lot of quantitative dose determinations as
16 that representing real data.

17 Well, if data from a man who worked
18 on weekends -- and there's even some dispute
19 of whether the law permitted working two days
20 on a weekend -- but obviously that is very
21 limited, restricted data from one individual

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1 who is not a full-time radiographer. 224

2 That's the only job description
3 that is represented among that data for those
4 film badges. There are 89 film badge -- film-
5 badge workers who have data out of a workforce
6 that range upwards of 3,000 a year, throughout
7 a 13-year period.

8 And to say that one set of data,
9 again, which we arranged for you all to have,
10 that that's representative of an entire ten-
11 year period is really astounding to me. And
12 I've said it before, but it does not seem to
13 score any points for this group, that, there
14 is no other place that I'm aware of in science
15 where the rule of statistics that data has to
16 be somehow representative of the population
17 could be so widely ignored. And if that's the
18 only degree of confidence you need in a
19 certainty of bounding, then you know I'm --
20 I'm just up against a hopeless situation that
21 I've never met a scientific group that

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1 accepted data like that, and I don't think ^{it}₂₂₅
2 represents good science, and I'm sure you all
3 strongly disagree with me, but that's the way
4 I feel about it, and I would not take any
5 comfort in the small amount of data.

6 I understand about the gentleman
7 wearing the film badge. Again, John Ramspott
8 sent you that picture. He supplied you with
9 that picture, and you know, yes, it is
10 evidence that some people had a badge, but
11 where's the data? That doesn't seem to bother
12 anybody.

13 If there was a program that the --
14 the license application in '62 outlines all
15 sorts of records that were supposed to be
16 kept, calibration tests and so forth. None of
17 the -- shot logs, the utilization and
18 maintenance records, none of that is there.

19 CHAIRMAN ZIEMER: Well, Dan, we're
20 all very much aware of that.

21 DR. MCKEEL: But you don't seem to

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2 CHAIRMAN ZIEMER: Well, look --
3 look. This is not unlike -- we have the very
4 same situation with the worker testimony. We
5 have very, very few workers out of that
6 workforce, and they're not unlike this one
7 case you're talking about, and they don't all
8 agree. And so, we're having to make judgments
9 based on a sparsity of information. That's
10 sort of the nature of this.

11 This is not a science experiment.
12 This is science and public policy. It is
13 very, very difficult. We know it. You know
14 it. We're doing our best to sift through
15 this. All of these cases are individual.

16 We don't know how representative
17 they are. We're trying to appreciate every
18 piece of information we get, and see if we can
19 use it, if it makes sense. So, you know, in a
20 certain sense we share your frustration. We're
21 -- but we are trying to do the best we can to

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1 sift the chaff from the grain, and make²²⁷
2 sensible decision.

3 I think it's one of those areas
4 where we won't all agree on either the
5 validity, the value or the interpretation of
6 all of these things. And you know that as
7 well as I.

8 So, you know, please be assured
9 that we are doing our best to be fair to all
10 of this data that we have. We're not ignoring
11 it. We're trying to judge it, evaluate it,
12 and see where it makes sense. In some cases,
13 it seems to reinforce certain things. In
14 other cases it seems to contradict. So,
15 that's part of the dilemma.

16 If it were much smaller,
17 straightforward, we probably wouldn't be where
18 we are right now, struggling with these kinds
19 of issues. But we will do the best we can
20 going forward to try to sniff these out, and I
21 know you're frustrated.

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1 DR. MCKEEL: No, I -- 228

2 CHAIRMAN ZIEMER: We are too.

3 DR. MCKEEL: I'd like to defend
4 myself. I'm really not frustrated.

5 CHAIRMAN ZIEMER: Well, maybe
6 that's not the right word, but --

7 DR. MCKEEL: No, that's not right
8 word. What I am is I am upset because what I
9 see is -- I appreciate everything you did.
10 It's a very tough job that you all must do,
11 and you work at it valiantly, and I think
12 everybody is -- I give the Board and SC&A and
13 NIOSH great credit for that. I am in that
14 camp.

15 But what I do think is that while
16 we're in this period of the ten-year review,
17 that as I look at difference SECs that have
18 been awarded quickly within months or weeks,
19 particularly from some of the larger DOE
20 sites, they have copious film badge data. They
21 have copious neutron data. They have copious

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1 bioassay data, none of which we have for GSI₂₂₉

2 And all I'm saying is that those
3 sites, I think, are awarded SECs because the
4 data is too scanty to actually calculate
5 doses. Whereas here, you take a dose from one
6 individual who works part-time, and his badge
7 therefore only part-time, and extrapolate to a
8 whole ten-year period based on that.

9 So, what I'm upset about is the
10 inconsistent way that criteria are applied for
11 recommending a denial or an approval of an
12 SEC. And those same comments would go for
13 NIOSH and for the -- but particularly for the
14 Board and for NIOSH.

15 I think they use different criteria
16 for judging different SECs that are just
17 simply not consistent. And I think there
18 comes a point where history is going to look
19 back at this program, and it's going to say
20 that the purpose of an SEC was, when there was
21 not enough real data to calculate a dose and

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1 bound it with sufficient accuracy for ~~all~~²³⁰
2 sources that were present at that site, that
3 that's the time right then that there
4 should've been an SEC awarded.

5 And when it drags on for years
6 after that point, and when SC&A is allowed to
7 do part of the new modeling and to reconstruct
8 new methods that will help NIOSH achieve their
9 goal, that's where I part company as being
10 within the guidelines for how the SEC process
11 should work.

12 So, no, sir. I'm not frustrated.
13 It's way beyond that. I am upset as a
14 scientist. And I don't think this program is
15 really about public policy. The public policy
16 has already been decided.

17 Public policy is in the preamble of
18 the Act that the workers were harmed by
19 activities sponsored by the US government, and
20 they are to be compensated. And so, I think
21 the public policy issues are well settled.

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1 What I think is -- that NIOSH ^{and}₂₃₁
2 the Board are about are about science, about
3 the science. And the science has got to do
4 with dose reconstruction and SECs applied in a
5 very strict context and with very strict
6 guidelines and rules.

7 I don't think they are being
8 applied consistently. So, I want that
9 represented as that's the way I feel about it.

10 CHAIRMAN ZIEMER: Okay, well,
11 that'll certainly be on the record.

12 DR. MCKEEL: Thank you.

13 CHAIRMAN ZIEMER: So, thanks for
14 those additional comments. I want us to take
15 a look at moving forward and maybe scheduling
16 another meeting.

17 DR. MAURO: This is John Mauro.

18 CHAIRMAN ZIEMER: Yes, John?

19 DR. MAURO: I'm sorry to interrupt
20 you, but there's something that is troubling
21 me, and I'm not sure it's appropriate to bring

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1 it up or not, but it is troubling me and I'm
2 going to bring it up anyway.

3 There probably are a substantial
4 number of workers who, maybe the predominant
5 number of workers, who have developed prostate
6 and skin cancer at this site.

7 If an SEC is assigned to any time
8 period, those workers will not be assigned a
9 dose on the order of anywhere from I guess 2
10 to 6 to 15 rem per year. They won't be
11 assigned a dose, though they may very well
12 have experienced a dose of that size. We
13 don't know, but they will not be compensated
14 if an SEC is granted.

15 CHAIRMAN ZIEMER: That is correct.

16 DR. MAURO: And I would suspect,
17 knowing the stats on different types of
18 cancers, that prostate and skin cancer is
19 probably the most prevalent amongst the worker
20 population. So, we are in a very -- I mean I
21 don't know whether or not that has any play

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1 here. But I actually feel as if I was²³³
2 worker there, and I developed prostate cancer,
3 and I was a radiographer and I was denied,
4 well, I would've been granted if they would've
5 used any of these models we're talking about,
6 but I'm denied because an SEC was granted, it
7 would trouble me.

8 CHAIRMAN ZIEMER: Well, I
9 understand your point, John, but I don't think
10 we're allowed to make a decision based on
11 thinking about whether or not an SEC would pay
12 off certain cancers better than other cancers.

13 DR. MAURO: And that's why I sort
14 of opened my statement saying, I probably
15 shouldn't say this, but it's troubling me
16 anyway. And I'll leave it at that.

17 CHAIRMAN ZIEMER: No, I -- and I
18 think this is true of any SEC: certain cancers
19 get excluded. And if the dose reconstruction
20 method is not accepted, it cannot be used to
21 reconstruct doses for those who get other

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1 cancers. 234

2 DR. MAURO: This side is rare and
3 unique. Most of the times SECs are granted
4 because of internal dosimetry issues. They
5 dominate. This is a site where concerns by
6 far are external, and so you have a unique
7 circumstance where, if there's any place where
8 this strained set of circumstances are real,
9 it's here.

10 CHAIRMAN ZIEMER: But that's not an
11 issue that we would be allowed to consider.

12 DR. MAURO: I understand.

13 CHAIRMAN ZIEMER: I don't think
14 legally we can --

15 DR. MAURO: I understand.

16 MR. KATZ: No, I agree. I mean
17 that's -- I mean I think, John, it is fine you
18 saying it. It's public education, I guess, in
19 this case. But it cannot have a bearing on
20 how the Board makes a decision.

21 DR. ANIGSTEIN: I just want to

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1 mention to you is, among the problems that²³⁶
2 people have faced including the workers, to
3 even judge the points that John Mauro just
4 brought up, I personally have had a long
5 discussion with the Department of Labor,
6 trying to find out the breakdown of specific
7 cancers at General Steel Industries, and have
8 not been able to get those data.

9 So, I really think that's a false
10 issue that he brings up. I don't think people
11 with prostate cancer are probably going to get
12 compensated. And I agree it -- what this is
13 is a statement that it would be better for
14 people not to have an SEC, and I am
15 particularly interested in this because I'm a
16 counselor also. I mean the co-petitioner at
17 Dow Chemical, as many of you all probably
18 know.

19 And so, I've been following for the
20 last six years the patterns of payment at GSI
21 and Dow. What it shows is a complete negation

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1 of that idea that an SEC is bad for you²³⁷
2 There are far fewer claims and cases at Dow,
3 and they've been paid overall approximately
4 twice as much as GSI, which has submitted a
5 far larger number of claims and cases and had
6 far more dose reconstructions.

7 And also, the covered period at GSI
8 is 13 years. At Dow, it is four years. So,
9 having an SEC at Dow is demonstrably a very,
10 very good thing for workers. And anybody that
11 could claim anything to be different would
12 have to do an analysis like I've done.

13 I'll be happy to send anybody who
14 is interested those figures. But having an SEC
15 for Dow was a very good thing, for just the
16 covered period. So, I had to make that
17 comment. That comment by Dr. Mauro just can't
18 stand. Thank you.

19 CHAIRMAN ZIEMER: Dan, I think it
20 is probably true at the other sites too, where
21 there are SECs. The percent of claims paid is

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1 certainly greater than the other, and there²³⁸
2 may be specific cancers that are not
3 compensated, but -- well, there are. I mean
4 those that were named, but I think it is
5 almost double at most of the sites. I'm
6 looking at Ted to see if he can verify that,
7 or Jim. But an SEC site has roughly twice as
8 many claims as a regular site.

9 MR. ALLEN: Right. In general, I
10 think it runs about 50 to 60 percent
11 compensation.

12 CHAIRMAN ZIEMER: Fifty to 60
13 percent?

14 DR. NETON: John Mauro's point is
15 well taken that this site is unique in the
16 sense that there's very high external
17 exposures here. Almost all the other sites --
18 I can't think of one that has been added
19 because of external. It has been added
20 because of internal exposures, which provide
21 almost zero dose to the prostate gland and the

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1 skin. 239

2 CHAIRMAN ZIEMER: Well,
3 nonetheless, I don't think we can take that
4 into consideration.

5 DR. NETON: No, I understand that,
6 but I think this is -- John Mauro's point was
7 interesting.

8 DR. ANIGSTEIN: When we're talking
9 about 12 to 15 rem a year, when we're talking
10 about much smaller dose, that's something
11 else.

12 DR. NETON: That's why I'm saying
13 all the cases that have been done at GSI would
14 be reworked --

15 CHAIRMAN ZIEMER: I don't want us
16 to spend time discussing this since it's
17 nothing --

18 DR. NETON: Exactly.

19 CHAIRMAN ZIEMER: -- in our
20 purview. Let's look at our calendars. We
21 have at the end of the year several more

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1 things coming from NIOSH. We need time for
2 SC&A to review those.

3 DR. ANIGSTEIN: Is that still on
4 track?

5 MR. ALLEN: It's on track. I can't
6 guarantee it won't be late, two weeks late.
7 But right now, it's on track.

8 CHAIRMAN ZIEMER: All right, the
9 federal budgets are still sort of up in the
10 air. So -- yes, assuming they're still --
11 they're on continuing resolution, and that's
12 the --

13 DR. ANIGSTEIN: Assuming SC&A still
14 has a contract next year.

15 CHAIRMAN ZIEMER: But anyway, we
16 need to look at probably late January.

17 DR. ANIGSTEIN: Not again. We're
18 talking about beginning of March. It comes a
19 little late, the report comes a little late. I
20 do have -- it may not seem like it, but I do
21 have other work.

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1 CHAIRMAN ZIEMER: It's not like you
2 guys are only working on this. You've got
3 multiple sites.

4 DR. ANIGSTEIN: I would like two
5 months, frankly.

6 CHAIRMAN ZIEMER: Can we -- can we
7 hit early March?

8 DR. ANIGSTEIN: Yes, with a
9 baseball bat.

10 CHAIRMAN ZIEMER: Well, now, which
11 days are good for Poston? Is it Tuesday and
12 Thursday? I think it is.

13 MR. KATZ: I think so, because
14 that's why he had a problem today. He
15 could've done it yesterday. So, Tuesday is
16 good for --

17 CHAIRMAN ZIEMER: How about March
18 6? I think we need to get a date down.

19 DR. ANIGSTEIN: What day of the
20 week is that?

21 MEMBER MUNN: I can't do early

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1 March. I can't do early March. 242

2 CHAIRMAN ZIEMER: How about the
3 following week.

4 MEMBER MUNN: Any time after the
5 15th.

6 CHAIRMAN ZIEMER: You know what? We
7 already penciled in the 15th.

8 MR. KATZ: Yes, I already have that
9 on mine.

10 CHAIRMAN ZIEMER: I just realized I
11 already have it down.

12 MEMBER MUNN: I do too.

13 CHAIRMAN ZIEMER: We're going to
14 meet, and then we're going to deal with these
15 additional issues. Well, we'll have a lot on
16 our platter, but we'll plow through that.
17 We're going to have NIOSH stuff. We're going
18 to have SC&A, and as we go, if we can close
19 out issues on the matrix, we'll do --

20 MEMBER BEACH: Or update the
21 matrix.

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1 CHAIRMAN ZIEMER: Or update ~~the~~²⁴³
2 matrix. Actually, Bob, can you make sure that
3 we get an updated matrix which will include an
4 enclosure of that --

5 DR. ANIGSTEIN: Sure.

6 CHAIRMAN ZIEMER: -- which is item
7 --

8 MEMBER MUNN: Four.

9 CHAIRMAN ZIEMER: -- four.

10 DR. ANIGSTEIN: Okay. We have two
11 matrices floating around at the same time. Do
12 we just do both, or just the SEC matrix?

13 CHAIRMAN ZIEMER: No, we finished
14 TBD-6000.

15 DR. ANIGSTEIN: I don't mean that.
16 I mean there is an Appendix BB matrix and a
17 SEC matrix for GSI.

18 CHAIRMAN ZIEMER: Right, those two.

19 DR. ANIGSTEIN: With some overlap.

20 CHAIRMAN ZIEMER: Yes.

21 DR. ANIGSTEIN: Do you want both

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1 matrices updated? 244

2 CHAIRMAN ZIEMER: It would be good
3 to do both.

4 MR. KATZ: Yes.

5 DR. ANIGSTEIN: Okay. It's going
6 to be a little while though.

7 CHAIRMAN ZIEMER: Well, there's not
8 a whole lot of change in them.

9 MR. KATZ: Do you want him to
10 update them now, or update them after the
11 papers come in and so on? Before the next
12 meeting for sure, but do you want them updated
13 now or do you want them updated once we have
14 the new material from --

15 CHAIRMAN ZIEMER: I don't think the
16 material will update anything per se, will it?

17 MR. KATZ: Well, there will be new
18 responses from NIOSH in effect.

19 MEMBER BEACH: SC&A will review.

20 MR. KATZ: And SC&A will review
21 those.

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1 CHAIRMAN ZIEMER: They can see ^{if}₂₄₅

2 there's any --

3 MR. KATZ: So, typically before a
4 meeting, we get a matrix that takes into
5 account a new response from NIOSH, a response
6 from SC&A, all of that, all in the matrix, so
7 it is all covered up and up to date for that
8 meeting. Because I don't see how the matrix
9 gets used before then. So, does that make
10 sense?

11 MR. ALLEN: It just seems like the
12 responses and the comments that are going to
13 get on the matrix are minimal compared to
14 these White Papers are going to be.

15 CHAIRMAN ZIEMER: Yes.

16 MR. ALLEN: It's not like you're
17 going to have pages and put them --

18 MR. KATZ: No, absolutely not. It's
19 -- the matrix is just used to keep us on track
20 for closing issues. Right?

21 MEMBER BEACH: Bob, can you send me

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1 your slide presentation? I didn't get it this
2 time around. ²⁴⁶

3 DR. ANIGSTEIN: Will do.

4 MEMBER BEACH: I know I'm not on
5 your list for some things.

6 CHAIRMAN ZIEMER: Let me thank the
7 petitioner, Dan. Thank you. And all the GSI
8 workers on the line, and others for your
9 participation today. We will meet again on
10 March 15th, and we expect that -- well, we'll
11 certainly keep you posted on any documents
12 that we develop in the meantime.

13 You can certainly feel free to keep
14 us posted on other issues, or comments that
15 you want to put in the record, as well, in the
16 meantime. Thank you very much, and we are
17 adjourned.

18 (Whereupon, the above-entitled
19 matter went off the record at 2:50 p.m.)

20

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