

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

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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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PANTEX PLANT WORK GROUP

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THURSDAY
AUGUST 4, 2016

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The Work Group convened telephonically, at 10:30 a.m. Eastern Time, Bradley P. Clawson, Chairman, presiding.

PRESENT:

BRADLEY P. CLAWSON, Chairman
JOSIE BEACH, Member
JOHN W. POSTON, SR., Member
PHILLIP SCHOFIELD, Member

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ALSO PRESENT:

TED KATZ, Designated Federal Official
NANCY ADAMS, NIOSH Contractor
RON BUCHANAN, SC&A
JOE FITZGERALD, SC&A
JENNY LIN, HHS
JIM NETON, DCAS
MARK ROLFES, DCAS
MATT SMITH, ORAU Team
DALE THOMAS, ORAU Team

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

2 10:31 a.m.

3 **Welcome and Roll Call**

4 MR. KATZ: This is an Advisory Board on
5 Radiation and Worker Health. It's the Pantex Work
6 Group. We haven't met in quite a while and we're
7 trying to wrap up from Site Profile issues post the
8 SEC work that the Work Group did, and the Board.

9 The materials for this meeting are
10 posted on the NIOSH website under the Board
11 section, under scheduled meetings, today's date so
12 you can look at -- you can see there the agenda,
13 which is composed of just a few items, and the
14 materials related to the agenda, they're available
15 for public scrutiny. So, you can pull up those
16 papers and kind of read alongside the Work Group.

17 So, the roll call now.

18 (Roll call.)

19 MR. KATZ: Okay, then. I'll just
20 remind everyone to mute your phones except when
21 you're speaking to the group.

22 And then, Brad, it's your meeting.

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1 **Status of Site Profile Issues: 2014 TBD Matrix, Last**
2 **WG Meeting, Recent TBD Interviews**

3 CHAIRMAN CLAWSON: Thank you, I
4 appreciate that.

5 I'd like to welcome you all here today.
6 And, Joe, I would like to thank you and say happy
7 birthday for all you've done there.

8 I wanted to just kind of step back a
9 little bit. This matrix has been out for a long
10 time. We've taken care of the SEC issues, and
11 these are just Site Profile issues that we're
12 trying to come to grips on.

13 And the last Work Group meeting was
14 September 4th, 2015. So it has been a while, so
15 I would go into these issues. Sometimes, we may
16 need a little bit of a background on it. And, so,
17 just to kind of bring us back up to speed and so
18 we don't confuse it with other sites, too.

19 So, I guess I'd go to Issue Number 1,
20 which is internal -- well, the external dosimetry
21 data. And, Joe, or SC&A gave a review and then
22 NIOSH responded to that. So I believe it's the
23 SC&A's -- in SC&A's hands.

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1 MR. FITZGERALD: Yeah, and these
2 external issues were primarily Ron Buchanan's
3 focal area on the TBD, so I'll turn to him.

4 But just to clarify, if you look at the
5 matrix that was provided, there's four items on it,
6 but yet only the first two are reflected in the
7 agenda.

8 The last two items, I think, we've
9 reconciled over the last year or so and we don't
10 have any remaining issues on those two. So, just
11 to clarify that.

12 So, what's here is what has not been
13 fully dispositioned and for which we had the most
14 recent exchange probably over the last several
15 months.

16 So, Ron?

17 **Site Profile Issue No. 1 Discussion**

18 DR. BUCHANAN: Yes, good morning, this
19 is Ron.

20 Issue Number 1 was interpretation of
21 the external dose data. And this has several
22 aspects to it.

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1 And this is simply the main issue was
2 how you interpret the zeros, the blanks, dashes,
3 hash marks and other markings in the dosimetry
4 record. Did this mean they weren't monitored or
5 were monitored and there wasn't any -- there was
6 no results or zero results or what?

7 And so this was addressed back and forth
8 over the last several years. And it was also
9 addressed in OTIB-86, which is the Pantex coworker
10 model, and we'll be talking some about that today.

11 And, so, essentially, we have worked
12 all this out, except for our response, most recent
13 response, and it's in the matrix there. You can
14 see, yes, that we agree with NIOSH except for where
15 they did not specifically include the word zero in
16 there. In other words, if there's hash marks,
17 dashes or blanks, how do you treat this data from
18 1976 to 1988?

19 And, so, the word zero was not in there
20 when you considered how you were to address this.
21 In other words, if there was hash marks, dashes and
22 such, what NIOSH says, okay, they will consider the

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1 person's workstation and determine whether that
2 should be assigned an LOD over two, a missed dose,
3 coworker dose or ambient dose.

4 And the word -- if the zeros were in
5 there, that wasn't included in the wording. And
6 I wanted to ask NIOSH, you know, that's where we
7 stand right now. We'd like to see the word zero
8 included in there.

9 MR. ROLFES: Okay, Ron, this is Mark.
10 And I know Dale Thomas, who was on the phone, had
11 looked into the issue.

12 As far as I'm aware, it's been a couple
13 of years since I've looked into the reporting of
14 external doses in the DoRMS database, but I don't
15 believe they would have been inserted a zero into
16 the DoRMS database for a person who was not
17 monitored.

18 And, Dale, do you call when you looked
19 into this issue what the reporting practice was
20 for, you know, whether an unmonitored person would
21 have had a zero inserted into the external
22 dosimetry records?

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1 MR. THOMAS: It doesn't appear that
2 they would have. If you look at the DoRMS
3 database, there's clear instances where multiple
4 cycles are missing for individuals. And my
5 understanding of what's going on is they weren't
6 monitored for those periods.

7 DR. BUCHANAN: So are you saying that
8 -- if there's a zero there, how will you handle
9 that?

10 MR. THOMAS: If there's a zero, we're
11 going to assume that that was the -- the person was
12 monitored, but the dosimeter result was less than
13 the LOD.

14 MR. ROLFES: Correct.

15 DR. BUCHANAN: Okay.

16 MR. ROLFES: Does that answer your
17 question, Ron?

18 DR. BUCHANAN: Okay, I believe it does.
19 That was -- because the word zero wasn't addressed;
20 you know, you addressed the hash marks, the blanks
21 and dashes and stuff, but it did not say how a zero
22 would be addressed.

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1 So you're saying that the zero would be
2 addressed as a missed dose?

3 MR. ROLFES: That's correct.

4 DR. BUCHANAN: Okay. Okay, the next
5 issue was the year 1988 or --

6 MEMBER POSTON: Hold on a second. I
7 want to make sure I understand.

8 DR. BUCHANAN: Okay.

9 MEMBER POSTON: You used the word
10 "missed dose." If it's a zero, doesn't it mean
11 that they didn't have a dose, they wore a dosimeter
12 and didn't have a dose?

13 MR. ROLFES: Dr. Poston, this is Mark.
14 That's correct. And, so, when we interpret the
15 dosimetry records, we would assume that they
16 received a dose less than the limit of detection.
17 And our typical approach is the limit of detection
18 divided by two times the number of badge exchange
19 cycles when that occurred.

20 MEMBER POSTON: Okay. Well, that's
21 different than a missed dose? I mean, is that what
22 you call a missed dose?

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1 MR. ROLFES: Yeah, if a person has a
2 zero in their dosimeter record, or in their
3 dosimetry records, we would assume that they could
4 have received some dose below the limit of
5 detection and it would be assigned as a missed dose.

6 MEMBER POSTON: Okay. It just seems
7 that's a strange way to say that. I mean, to me,
8 a missed dose means they didn't -- you didn't
9 monitor it.

10 MR. ROLFES: Yeah, but we refer to that
11 as an unmonitored dose instead.

12 MEMBER POSTON: Okay.

13 MEMBER BEACH: Well, beyond that --
14 this is Josie -- is that common knowledge? Do all
15 the dose reconstructors know that? Shouldn't that
16 -- or that is common?

17 MR. ROLFES: That is, Josie. It's in
18 our implementation guidelines, our external
19 dosimetry --

20 MEMBER BEACH: Okay. So, it's not a
21 professional judgment, it is a --

22 MR. ROLFES: Not at all.

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1 MEMBER BEACH: -- an actual way you do
2 business. Perfect, thank you.

3 MR. ROLFES: One of the first approved
4 documents on the project --

5 MEMBER POSTON: Josie, I guess the only
6 people don't know that are you and me.

7 MEMBER BEACH: Yes. But then I'm not
8 a dose reconstructor, so that's okay.

9 MEMBER POSTON: Thank you.

10 DR. BUCHANAN: Yes, okay, that's what
11 I wanted to clarify. Yeah, a missed dose is
12 counted as when a person's monitored and have a
13 zero, but I wanted to clarify that.

14 The next issue was 1988 or 1989. NIOSH's
15 response said that before '88, not everybody was
16 monitored. And '88 and after, everyone that was
17 in a radiation field was monitored.

18 And what my question is, the TBD used
19 the year 1989. And, so, I wanted to clarify, is
20 it '88 and '89? And whichever year it is, it should
21 be consistent in OTIB-83 and TBD-6.

22 MR. ROLFES: Ron, this is Mark. And I

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1 did speak with Dale about this yesterday. Dale,
2 I'll let you answer, if you don't mind, because I'm
3 not quite as familiar with this.

4 I thought it was '89 that the majority
5 of the workers -- I know, as far as access controls,
6 things were different in 1989, but I don't know as
7 far as monitoring whether it was '88 or '89 off the
8 top of my head.

9 MR. THOMAS: Yeah, it's the lower. It
10 is '89 and the matrix design invariantly put '88
11 in that second paragraph. So that should be for
12 1989 and later years all personnel who enter the
13 operational areas of the plant were required to
14 have a dosimeter.

15 DR. BUCHANAN: Okay. 1989, okay.
16 Now, we should check with TBD and OTIB-86 and make
17 sure that they all agree with that, or if it's just
18 -- do you know if this is just on the matrix that
19 this is on or was --

20 MR. THOMAS: I double-checked the TBD
21 yesterday and it does say it. It was just my error
22 on the matrix.

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1 DR. BUCHANAN: Okay.

2 MR. THOMAS: Yeah. Does that answer
3 the question?

4 DR. BUCHANAN: Yes, that's what I
5 wanted to clarify.

6 MR. THOMAS: All right.

7 DR. BUCHANAN: Okay, that was Issue
8 Number 1 which is external dosimetry
9 interpretation of the data. And, I had no further
10 issues on that. So, that's up to the Work Group
11 at this point.

12 CHAIRMAN CLAWSON: This is Brad. So,
13 this has satisfied, Ron, this has satisfied what
14 your concern was with it?

15 DR. BUCHANAN: Yes, it was minor
16 details.

17 CHAIRMAN CLAWSON: So, I guess I'd ask
18 the rest of the Work Group Members, I have no more
19 problems with it and we can go ahead and close this.
20 How do the other Work Group Members feel?

21 MEMBER BEACH: Brad, this is Josie. I'm
22 in agreement with that.

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1 CHAIRMAN CLAWSON: Okay.

2 MEMBER POSTON: Fine with me.

3 MEMBER SCHOFIELD: Fine with me.

4 CHAIRMAN CLAWSON: Sounds good. That
5 being done, we'll proceed on to Item Number 2.

6 **Site Profile Issue No. 2 Discussion**

7 DR. BUCHANAN: Okay. Item Number 2 is
8 the neutron dose. And this has shifted back and
9 forth between using NTA film. And, of course, they
10 used NTA film up until about '73 or '74 and they
11 shifted to TLDs.

12 And this says it went through quite a
13 few processes over the years of working this out
14 and it has boiled down to, in the NTA era, before
15 1974, say, was going to use NTA film. Then they
16 wanted to use the N over P ratio.

17 And then the reason they came back to
18 using NTA film, and the two -- one minor issue is
19 when did they switch, '73 or '74? And the TBD has
20 one date and then I think OTIB-86 has a different
21 date. NIOSH's recent response said it was changed
22 between '73 and '74.

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1 So, we just need to be consistent in
2 that and the wording consistent. And that would
3 be in the revised OTIB-86 and TBD-6.

4 And this is not really an issue. The
5 main issue is the NTA film corrections.

6 So, in the TBD-6, they said, okay, we're
7 going to use the NTA film data for the early years
8 and it's going to be applied according to OTIB-86.

9 And, so, I guess we're kind of a gray
10 area. I don't know if we address this in the TBD
11 section for Pantex or the procedure section for
12 OTIB-86.

13 We don't really have a problem with
14 doing that, it's just the neutron boils down to the
15 neutron correction factors, the energy correction
16 factors, the angular distribution and fading.

17 And, so, I guess I'd like to ask the Work
18 Group, at this point, do we discuss that today or
19 do we discuss that when we discuss OTIB-86?

20 CHAIRMAN CLAWSON: Actually, I guess
21 I'm up to suggestions on that. I'd like to be able
22 to close these, but I don't know how to be able to

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1 also track that, too, just in the OTIB-86.

2 MR. SMITH: Sorry to interrupt, this is
3 Matt Smith with ORAU Team. I can give some
4 background information and give some mile posts or
5 guide posts discussion.

6 CHAIRMAN CLAWSON: I'm sorry?

7 MR. SMITH: In the existing OTIB-86
8 that's the current revision on the website, if
9 going to Attachment B, you'll find the write-up
10 that's the supporting information for the 2.9 NTA
11 correction factor.

12 And when you get to the very last page,
13 24.24, in the conclusions and in the paragraph
14 right above it, the authors there are putting forth
15 their justification for the 2.9 factor.

16 They took a look at the results from a
17 workshop way back in 1969 with -- that was hosted
18 by Vallario and came up with some justification for
19 the factor there.

20 They also, in the paragraph above,
21 mention that because fading was taken into account
22 during the processing of the NTA film, they thought

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1 the sub-factor of 1.56 for fading was
2 claimant-favorable.

3 Just for reference, the -- I don't have
4 SRDB number for the Vallario report in front of me.
5 But it is in the reference section of OTIB-86.

6 A little bit of background on that, as
7 they look at the Vallario report, they found
8 information from the folks at Savannah River.
9 They were working on the -- what we call the belly
10 dosimeter for doing neutron dose. And they were
11 seeing a 25 to 50 percent on under-response.

12 They also took a look at the 50 percent
13 under-response and folded in the angular
14 correction as well and came up with an estimate of
15 2.7.

16 I took another look at some data that
17 was not looked at by those original authors. I dug
18 into the Hanford TBD and found a reference to some
19 data that was taken in 1972. So, this is that era
20 when they were switching over at Hanford from NTA
21 to TLD.

22 And they did some side-by-side

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1 comparisons, and the SRDB number for that is 13698.
2 If you go to -- later on, if you go to page 13 of
3 33 in that reference, you'll find some data from
4 the Plutonium Finishing Plant.

5 So, there, you know, I'm trying to take
6 a look at a source term that's similar to what we're
7 dealing with at Pantex.

8 And in looking at some data, there's
9 three data points there where they did some
10 long-term exposures between 2 and 72 hours, placing
11 TLD and film to looking at the fast neutron results.
12 They came up with factors between 1.85 and 2.

13 So, that's, you know, straight on, you
14 know, no angular response, no fading folded in.
15 But in terms of energy under-response, they were
16 getting values, as I just said, between 1.85 and
17 2.

18 It seems like the 2.9 is likely a good
19 value to be using. Another site that does take
20 this approach is Idaho. And I know there's a lot
21 of work going on with Idaho, but for the document
22 that's on the street, the factor there at Idaho for

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1 correcting NTA film ranges between 1.25 and 2.3.

2 So, you know, we feel that the 2.9 has
3 a good pedigree to it.

4 CHAIRMAN CLAWSON: Ron, do you have
5 anything to comment on that?

6 DR. BUCHANAN: Well, of course, this
7 authority is a constant issue on the NTA film at
8 any site.

9 We had talked some in the -- well, Mound
10 had been used somewhat for Pantex. And in Mound,
11 they used -- NIOSH used a different fading factor
12 and knew that the NTA film was calibrated in the
13 middle of the cycle.

14 And, so, I don't know what Pantex's
15 calibration cycle was. I don't believe it was
16 stated. But if it appeared that Mound data there
17 showed two possibilities: a 9 percent fading factor
18 and a 33 percent fading factor.

19 And, so, the larger was assigned in
20 Mound and the lesser was assigned at Pantex. And,
21 so, this is what I had the problem with.

22 Also, there's three main factors.

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1 There's the energy response, there's the angular
2 response and there's fading factor.

3 And the energy response, according to
4 NIOSH's response, they said they modeled for Mound
5 their standard room for so much moderation so that
6 the NTA film responded so much -- didn't see some
7 of the lowering of the neutrons and compensated for
8 that. That was part of this overall factor.

9 And then another part was the angular
10 response and then tracking the fading factor, which
11 was just discussed briefly.

12 And those three issues, what we found
13 when we read the response, was that the modeling
14 done for Pantex appeared to be the exact same as
15 Mound. There was no difference in that
16 arrangement, that we could see.

17 And it did not include any PA
18 arrangement. That's the main thing, using Mound
19 modeling for Pantex, they have to consider that
20 there could be PA neutron source. The way I
21 understand it, they had maybe modeled for sources
22 around and it could be irradiated from the back,

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1 whereas Mound was irradiated directly from the
2 front, and assume AP geometry.

3 And that also impacts the angular
4 response, not only the energy level but the
5 angular.

6 And the third thing was the fading
7 factor at Mound, it was calibrated in the middle
8 the cycle, and they used the larger fading factor.

9 And, so, these were the three questions
10 that we brought out.

11 Number one was the modeling for the
12 lower energy test was for Mound, not Pantex. The
13 PA neutron exposure was not considered. And the
14 same thing for the angular response. And the track
15 fading, the lesser amount was chosen.

16 And, so, these were our three issues
17 with this using the new approach.

18 MR. ROLFES: This is Mark, Ron.

19 As far as the geometry issue, the
20 majority of the dose received by an individual, if
21 they're working in an assembly cell, the majority
22 of the dose that the individual would be receiving

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1 would be that with which, you know, if they're
2 working with a component sitting in front of them,
3 a foot away from them and in front of them, hands-on
4 work, that's what's going to be delivering the dose
5 and not, you know, multiple components in the back
6 of them.

7 And there's typically going to be six
8 or more feet of separation between them and the
9 components in staging behind them around the
10 parameter of a cell.

11 The doses, you know, even if the dose
12 in front of them, if something's getting a dose rate
13 of 10 millirem per hour in front of them, that's
14 likely to be the culprit in giving them a recordable
15 dose on their badge versus, you know, the
16 components that are eight feet away that are
17 reading, you know, close to background.

18 Just, you know, as you know, distance
19 from the source of radiation, if the distance
20 doubles, the dose rate's going to decrease by, you
21 know, a factor of 4. So when you get out to 8 feet,
22 you're, you know, at a 10th of a millirem per hour,

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1 about. That's not going to be a significant
2 contributor to the dose that an individual
3 receives.

4 Now, that being said, that's not the
5 only, you know, issue. There's other geometry
6 issues, such as people doing vault work, for
7 example, at the, you know, end of the month, the
8 recorder taking inventory.

9 But from my understanding, the angular
10 response that we have, the factor of 1.33, was based
11 upon a study that was done by Ron Kathren back in
12 1965, and it does incorporate rotational movement
13 of the badge and accounts for interior to posterior
14 and posterior to interior and lateral exposures.
15 And that 1.33 value is a composite of basically all
16 those movements and different exposure angles.

17 Let's see, as far as the corrections for
18 neutron energies, we've chosen the correction
19 factor that is the higher of the two potential ones.

20 When individuals are working in the
21 cells, they have to work with another individual.
22 And it might be one individual working on a weapon

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1 and on a components and another individual either
2 reading instructions or just observing the work
3 that's conducted in the cell. And the neutron
4 energies are going to be lower for the individual
5 who was further away from the radioactive
6 materials.

7 And, so, we've chosen the factor for the
8 observer position because it'll result in a higher
9 amount of lower energy neutrons and it'll increase
10 the correction factor that we use to essentially
11 multiply or add neutron dose back to that
12 individual.

13 As far as track fading, I can't speak
14 directly to that, but I think we've laid it out
15 originally back in the 2011. I don't have anything
16 to add on that issue.

17 And I wanted to point out the one other
18 thing that Matt had identified, the Vallario,
19 Hankins and Unruh reference, that AEC Workshop on
20 Personnel Neutron Dosimetry. He mentioned the
21 SRDB number, that's SRDB 11096. I just wanted to
22 point that out since Matt didn't have that in front

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1 of him.

2 Anyway, if you have further questions.

3 MEMBER BEACH: Mark, this is Josie. I
4 just have one more on that fading. So, you've laid
5 out the 9 percent and why you chose 9 percent. Or
6 there's some room in there?

7 MR. ROLFES: Let's see here.

8 MEMBER BEACH: And I guess that's not
9 a very good way to answer. Could 9 percent and 33
10 percent, that's quite a bit of a difference between
11 the two. I guess I'm a little stuck on that answer
12 you gave on that one.

13 MR. ROLFES: Let's see, track fading
14 was studied by the Mound staff in '67 and '68 and
15 the Mound report was issued. And I think this was
16 also published in the Health Physics Journal as
17 well.

18 Let's see, 33 percent of the tracks
19 faded after a week, exactly 56 percent faded after
20 two weeks. Now, I believe Mound was aware of the
21 issue and accounted for track fading.

22 As far as Pantex, Pantex did not do the

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1 -- they did not read the neutron badges in-house.
2 That was conducted by Landauer.

3 I didn't specifically -- I did speak
4 with someone at Landauer, but it was related to
5 another issue, about the time when -- because we
6 had originally believed that Landauer had a
7 contract with Pantex to supply neutron badges up
8 through '76 or '77. It turned out that the
9 contract for personnel neutron dosimetry with
10 Landauer was terminated in 1973. And they
11 transitioned in 1974 over to TLDs that were
12 in-house by Pantex staff. And that sort of
13 transitioned into another issue, about the 1975
14 neutron dose.

15 But maybe if Matt Smith might be able
16 to help me with why we chose a particular correction
17 factor for track fading versus another.

18 I don't have a better answer at this
19 time. This was the one of the three issues that
20 I didn't follow up too closely on because I didn't
21 think this would be the bigger issue.

22 MR. SMITH: Yeah, again, the

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1 difference is from, you know, the original authors
2 -- and, again, Attachment B was originally a White
3 Paper that was kind of on its own that's since been
4 folded into OTIB-86 and then, ultimately, into the
5 TBD.

6 And, basically, again, they're stating
7 there on page 24 that, because fading track
8 corrections were incorporated into the process and
9 protocol, the recommendation to apply a fading
10 correction of 1.56 is favorable to the claimant.

11 I wasn't working on Pantex things in
12 2011, so I did not talk with the original authors
13 on this back then, and not all of them are available
14 right now.

15 CHAIRMAN CLAWSON: This is Brad. So,
16 I'm trying to follow what you're saying on this.
17 What you're telling me, what I'm getting from this
18 is that, at Mound, they knew that there was fading
19 and that they made a correction factor for that.

20 But we don't know, at Pantex, if they
21 used a correction factor. Is that correct?

22 MR. ROLFES: Well, this is Mark. And

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1 Mound was aware of this 1965 and published in Health
2 Physics Journal. Although we haven't
3 specifically asked Landauer if they were aware of
4 track fading in 1965, one would believe, because
5 of the, you know, exchange of information, that it
6 was likely something they were aware of as a large
7 vendor of dosimetry for the Department of Energy.

8 We haven't specifically asked them or
9 Pantex if they were aware of this. But, you know,
10 we haven't specifically, in the past -- it's been
11 five years since we really discussed this.

12 CHAIRMAN CLAWSON: I know, and I -- but
13 we're -- it's hard and I realize that. I'm just
14 -- I'm trying to follow this and we're making some
15 assumptions here that I'm not feeling too sure
16 about.

17 Because each one of these, as we've seen
18 in all of these sites, each one of these sites has
19 done something a little bit different. Just
20 because one site knew that I'm not taking it that
21 all sites performed that way.

22 So I'm trying to figure a path forward

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1 for this, and I guess I've kind of asked Ron what
2 -- Ron or Joe, what their feelings on the path
3 forward for this. Because I'm just going to say
4 my personal feeling is I don't feel too good about
5 this right now.

6 DR. BUCHANAN: Well, let me ask a few
7 questions here. Do you know when the calibration
8 cycle was done at Pantex? They were sending to
9 Landauer, they read them, do you know if they did
10 a calibration in the middle, beginning or end of
11 the cycle?

12 MR. ROLFES: This is Mark. Off the top
13 of my head, I couldn't answer that question.

14 DR. BUCHANAN: Okay. And, you know,
15 there was some talk about, you know, they put the
16 main source six to eight feet from anybody else and
17 radiation and stuff.

18 Now, I believe that Ron's book or paper
19 in '63 on the angular response, I don't believe it
20 included any PA radiation, if I recall correctly.
21 It was frontal and angle out to like 270 degrees
22 or something or-- I mean 180 or less, not 270 or

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1 360. Anyway, I just want to put that in. I don't
2 believe it was.

3 And on the Mound calculations, using
4 this at Pantex, and you said you used the worst case
5 scenario for the observer. But there was no
6 looking at to see if that fit Pantex's arrangement
7 of the average worker in their work area. Was this
8 just going to just blot over and said, okay, this
9 covers the maximum situation? Or was there any
10 adjustment or looked at to see if this fit Pantex?

11 MR. ROLFES: For the observer position
12 versus the individual doing the assembly, that was
13 Pantex-specific. It's a little bit different than
14 at Mound.

15 This was all modeled, you know,
16 basically inside of a round room and inside of a
17 Gravel Gertie. I think we've laid out the details
18 of how we did the modeling.

19 And I'm referring back to a report from
20 2011, which parts of were taken and put in as an
21 attachment to OTIB-86. But the paper that I'm
22 referring back to where we've discussed our

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1 correction factors is the "Pantex NTA film issues
2 and dose assignments to monitored and unmonitored
3 workers."

4 And that describes some of the
5 correction factors that we've developed for
6 neutron energy, angular response and track fading.

7 DR. BUCHANAN: Which paper is this that
8 you're referring to? Are you talking about 86?

9 MR. ROLFES: This is information from
10 OTIB-86, the attachment was collected from a White
11 Paper dated April 18, 2011. And it's the "Pantex
12 NTA film issues and dose assignments to monitored
13 and unmonitored workers."

14 DR. BUCHANAN: What was the date on
15 that?

16 MR. ROLFES: April 18th, 2011. The
17 approach, the technical approach and details are
18 discussed, and the bases for choosing each of the
19 correction factors, in this White Paper.

20 MEMBER SCHOFIELD: Mark, this is Phil.
21 I've got a question. On the use of the Mound, where
22 they're going to use four inches of moderation, it

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1 seems like, to me, when we were there in the -- I
2 didn't see -- there was a lot of areas that were
3 not shielded by a four inch of whatever, water or
4 whatever they wanted to use, plastic or Plexiglas,
5 whatever. So I don't see how you can use four
6 inches of moderation for all of the response.

7 MR. ROLFES: Got you. Assuming that
8 there is some moderation present would increase the
9 number of low energy neutrons that person would be
10 exposed to, and thereby increase the correction
11 factor that we apply.

12 So if we assume that there is no
13 moderation, the correction factor that we would
14 apply for missed low energy neutrons would be very
15 low and not as claimant-favorable than to assume
16 that there is moderation present.

17 MEMBER SCHOFIELD: Okay.

18 DR. NETON: Yeah, this is Jim. I've
19 been taking all these technical issues in and it
20 seems to me that we're trying to fine-tune some of
21 this stuff that we probably will never be able to
22 definitively figure out. And there's been a lot

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1 of speculation involved as to where the workers
2 were and that sort of thing.

3 And I'd just like to remind everybody
4 that this site is already an SEC for its entire
5 operational history, save the first few years.

6 And if you look at the coworker model
7 in OTIB-86, the geometric mean dose starting in
8 1963 is 63 millirem, and it goes down to 52 millirem
9 in 1973 or 1974. So these are small doses we're
10 talking about here that apply to nonpresumptive
11 cancers.

12 I'm not sure how much extra effort to
13 engage in speculation on what, you know, some of
14 these, what I call, fine-tuned issues are is
15 warranted.

16 MR. SMITH: This is Matt Smith with
17 ORAU Team.

18 That brings up one more point I wanted
19 to make in that, looking at Table 7-2, which is the
20 coworker neutron data, if you look at the cut-off
21 line, and again, the OTIB that's on the street, we
22 use the 2.9 factor after 1977. That's going to

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1 change with the revision. It'll end in -- at the
2 end of 1973.

3 But, again, as Jim pointed out, if you
4 look at the geometric mean, that's probably in the
5 95th percentile values, we see those higher values
6 in the pre- or during the NTA era. When you look
7 at the dividing line when it's switched over to TLD,
8 you don't see any radical jump in the dose numbers
9 that are there. That would seem to indicate, to
10 me, that the 2.9 factor is, in fact, doing the job.

11 I know there are a lot of different
12 campaigns with different things going on within the
13 Pantex plant over the eras. Certainly, we don't
14 see that radical jump that one can look at if you
15 look at Hanford data pre- and post-1972 without a
16 correction factor involved.

17 CHAIRMAN CLAWSON: Ron, did you have
18 anything more to add to this? And, Jim, thanks for
19 weighing in on that. That's something important
20 to keep in mind, too.

21 DR. BUCHANAN: Just had one question.
22 On page 21 of OTIB-86, I did not gather out of that

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1 that they had modeled this specifically for Pantex.
2 It refers to Los Alamos National Lab 2003, and
3 that's just the Monte Carlo program. I didn't see
4 that it had anything to do with modeling for amount
5 or Pantex.

6 Are you saying that in your energy
7 lowering of your response model, you modeled that
8 for the Gerties and stuff at Mound and you modified
9 -- I mean, at Pantex you modified Mound to represent
10 Pantex and recalculated it?

11 MR. ROLFES: Yeah, this is Mark. And
12 the input parameters for the MCNP run for -- or
13 correction factors following assumptions were
14 applied. And we used weapons grade plutonium
15 metal with a spontaneous fission neutron spectrum,
16 average energy of about 1.9. And maybe we used an
17 RDX moderator with various thicknesses, from zero
18 to four inches, symmetrical three meter tall
19 concrete silo with 12-inch thick walls, 12-inch
20 thick ceiling and floor. And we assumed that there
21 was a point source located one meter above the
22 floor. There were operator and observer distances

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1 of 60 centimeters and 240 centimeters.

2 So, yes, it was specifically modeled
3 for Pantex neutron exposures.

4 DR. BUCHANAN: Well, this sounds very
5 similar to the Mound one.

6 MR. ROLFES: I wouldn't be aware of any
7 -- yeah, it would be similar but there shouldn't
8 be any RDX present at the Mound in such an area.
9 But, okay. So, yeah, it is very similar.

10 DR. BUCHANAN: Okay. Well, I guess,
11 at this point, I guess it's up to the Board, the
12 Work Group, if they want to hash this out in finer
13 detail or, you know, leave it as it is. That's up
14 to you.

15 I think that there is some fine-tuning
16 that could be done on it. But I don't know, you
17 know, how much results it'd bring. If you could
18 give us some guidance on that, whether you want us
19 to spend more time on this or not.

20 CHAIRMAN CLAWSON: This is Brad. I
21 guess on working with the other Board Members of
22 what they want to do. And the possibility that

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1 we've already spent a couple of years on the neutron
2 issues. So, I guess I'm looking for the path
3 forward of what would they like to see.

4 I think we're -- but I will say, as Mark
5 has pointed out, and Jim, that we're looking at a
6 very small dose.

7 MEMBER SCHOFIELD: Brad, this is Phil.
8 That correction factor on the neutron seems like,
9 to me, it's quite claimant-favorable. I'm not
10 sure how well you can really fine-tune it without
11 knowing exactly where everybody was, you know, was
12 this particular device being moderated by the four
13 inches or did they not have any there, whether a
14 cage?

15 And by using that factor seems like that
16 it'd actually boost the amount of neutron exposure
17 people are credited with.

18 CHAIRMAN CLAWSON: John, what do you
19 have to say?

20 MEMBER POSTON: Brad?

21 CHAIRMAN CLAWSON: Yeah?

22 MEMBER POSTON: This is John. I agree

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1 with Jim. I think we've done about all you can do.
2 You know, there are questions that we may never be
3 able to answer precisely. And I don't believe that
4 that's really the intent on what we're supposed to
5 be doing.

6 So I think we just need to agree or agree
7 to disagree that this will never be solved and leave
8 it as it is. Fine-tuning and deciding -- those
9 three sites are different as can be. I've looked
10 at them in the past in my own research going all
11 the way back when I was at ORNL, and I don't see
12 exactly how you can tie those three together where
13 you can take data from one and use it at the other.
14 So I think we're doing about the best we can do.

15 CHAIRMAN CLAWSON: Okay. Josie?

16 MEMBER BEACH: Well, I guess the only
17 thing we're not in total agreement on is the second
18 item. Correct? The other ones, we've come to an
19 agreement with?

20 CHAIRMAN CLAWSON: Right. And, Joe, I
21 was going to have you run over the other four items
22 that were in that matrix that we kind of resolved

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1 just to bring us back up to it, if you have that
2 available.

3 MR. FITZGERALD: Yeah, I have it.

4 CHAIRMAN CLAWSON: But, anyway, Josie,
5 yes, that's where we're at.

6 MEMBER BEACH: Yeah, I guess I'm a
7 little bit on the fence. I'd like to see closure
8 on all these items that SC&A -- in the second area.
9 But I'm --

10 MR. FITZGERALD: Well, you know,
11 there's maybe another course. I think Ron was
12 indicating he had not had a chance to look at the
13 paper that Mark had referenced a little earlier.

14 MEMBER BEACH: Correct.

15 MR. FITZGERALD: And we could take a
16 look at that, make it a relatively brief look, and
17 maybe get back to the Work Group in the context of
18 the discussions we've had about diminishing
19 returns, whether we believe it would make any, you
20 know, significant difference technically.

21 And if not, then we would, I think,
22 defer to the Work Group. And, certainly, the

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1 direction seems to be, unless it makes, you know,
2 makes a difference, then let's just let this
3 particular issue go.

4 MEMBER BEACH: Yeah, I think I'd be
5 more comfortable with that path, Brad, that Joe
6 just lined out.

7 CHAIRMAN CLAWSON: Okay, well --

8 MEMBER POSTON: That's fine with me if
9 that's the way you want to go.

10 CHAIRMAN CLAWSON: Yeah, let's do
11 that, Joe. We'll just expect a White Paper or
12 something?

13 MR. FITZGERALD: Well, not even that.
14 I would think a memo or a note to the Work Group,
15 copied to NIOSH, that just says, you know, Mark and
16 his folks have identified additional references
17 which we had not factored in that would be pretty
18 informative to what we're doing.
19 But understanding the larger context and doses
20 involved, where does that leave us?

21 And basically to provide that feedback
22 to the Work Group that, you know, with this

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1 additional, does it make a difference, not make a
2 difference? And if it doesn't make a difference,
3 then we would probably recommend closure on that.

4 MR. KATZ: And, Joe, and at least Brad,
5 if I could just suggest that we spare us having to
6 have a teleconference for something that's really
7 not worth have a teleconference for. I mean, if
8 Joe recommends, if SC&A recommends that we're
9 talking about trivial dose here and it's not worth
10 more work and it can be closed, if the Work Group
11 wants to agree with that advisement to close it,
12 we could agree to that now, we wouldn't have to meet
13 just to do that.

14 CHAIRMAN CLAWSON: That's a good
15 point, Ted. And I agree with you and I'll put this
16 out to the other Board Members.

17 If we can, as they've put out there, if
18 there isn't a significant path forward or a big --
19 if SC&A recommends that we close it, that this
20 Number 2 go ahead and be closed. Is that alright
21 with the rest of the Board Members?

22 MEMBER BEACH: Brad, this is Josie.

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1 That would be perfectly acceptable to me.

2 CHAIRMAN CLAWSON: Okay. Phil?

3 MEMBER SCHOFIELD: Brad, this is Phil.

4 I have no problems with that to closing it.

5 MEMBER POSTON: This is John. I have
6 no problems closing it.

7 CHAIRMAN CLAWSON: Okay, that sounds
8 good.

9 **Discussion of Remaining Issues**

10 That being said, we have four other
11 items and I was just -- and they've kind of come
12 to a closure on that. And I was just wondering if
13 I could have Joe go over those just a little bit
14 to just kind of refresh us where we're at on them
15 and how we came to closure.

16 DR. BUCHANAN: Before we go into that,
17 can I ask that whoever gave that reference, if
18 they'd send it to my CDC email so that I make sure
19 I'm looking at the right reference? On the 18th
20 of April, 2011, Pantex dosimetry document, if you'd
21 send that to my CDC email, that way I'll know for
22 sure I'm looking at the right one.

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1 MEMBER BEACH: I think that was Mark
2 that gave that reference.

3 MR. ROLFES: Oops, sorry, I was on mute
4 there. Yes, Ron, it was Mark that provided the
5 reference. I will send that out to you. Keep in
6 mind, though, that the tables that contain the dose
7 values in there aren't going to be used. It's just
8 the technical discussion for the three different
9 correction factors that I was referring to.

10 And this is largely what's in the
11 Appendix of OTIB-86. But I will send that to your
12 email address after we are finished with the Work
13 Group meeting here.

14 DR. BUCHANAN: Okay. And the second
15 item was we were going to look at if the 1975 neutron
16 doses end times are greater than the others.

17 MR. ROLFES: Yes, and I'd be happy to
18 answer that for you now. I had alluded to that
19 earlier, and, basically, when we completed our
20 initial work, we had believed that we had a contract
21 -- or Pantex had a contract with Landauer for
22 personnel neutron dosimetry up until 1976 or 1977.

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1 However, I spoke with the vice
2 president of Landauer a couple of months back, I
3 believe it was, and he was able to check into the
4 Landauer records that they had for Pantex, and he
5 was able to determine that the contract with Pantex
6 ended in 1973 for personnel neutron dosimetry.

7 So that means that Pantex was either,
8 you know, obtaining dosimetry services from
9 another contractor or they were doing neutron
10 dosimetry in-house.

11 And during the 1974 and 1975 time
12 period, I found a number of communications between
13 the Pantex radiation safety manager and other
14 radiation safety employees at Rocky Flats, at
15 Hanford, and there possibly was one other. But it
16 was during this time period that Pantex was
17 comparing their neutron dosimetry measured by TLDs
18 to neutron doses recorded on Battelle dosimeters
19 and on Rocky Flats dosimeters.

20 And, so, this is another piece of
21 information that indicates to me that, you know,
22 Pantex was trying to fine-tune their algorithm for

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1 neutron doses, trying to, you know, do some round
2 robin studies, essentially, to compare their doses
3 to other DOE site doses.

4 And that is likely the largest
5 contributor, the largest -- you know, the reason
6 why the doses are probably a factor of ten times
7 higher during this late 1974 and 1975 time period,
8 because that was the year that Pantex was
9 essentially doing neutron dosimetry in-house.
10 And they're probably fine-tuning things, learning
11 how to adjust for, you know, mixed fields, and they
12 were using a relatively simple dosimeter, I
13 believe, at that time period.

14 Some of the other reasons that we looked
15 into, but couldn't find any information to, you
16 know, explain why neutron doses might have been
17 higher in that year, you know, I had speculated that
18 it could have been, you know, additional, you know,
19 quantities of fissile material coming in from the
20 Iowa Ordinance Plant, which closed down in 1974 and
21 1975.

22 I've speculated maybe it was, you know,

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1 a large amount of time spent on inventorying
2 materials sent into the Pantex Plant, because
3 Pantex became the only site in the United States
4 at that time that was responsible for the assembly
5 and disassembly of nuclear weapons after the Iowa
6 Ordinance Plant had closed down.

7 So, that was one issue that I thought
8 might have been the reason. But you'd think that,
9 you know, that wouldn't account for a factor of ten.
10 That would only, you know, maybe a factor of two
11 or something if they received a bunch of materials.

12 Other issues, you know, I thought maybe
13 the production rates had increased. But couldn't
14 find anything to support that.

15 Let's see, there were, you know, I
16 looked into issues pertaining to, you know, any
17 anomalous issues with particular programs that
18 were being handled then. That was not an issue.

19 I'm trying to find my email that I had
20 originally sent, because I did speak with
21 individuals down at the Pantex Plant concerning
22 this issue on more than once occasion, and then

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1 spoke with people at DOE Headquarters at NNSA. I
2 wasn't able to obtain any information that
3 supported some of my theories.

4 And, so, I think, at the end of the day,
5 this factor of ten is really due to the switching
6 over from NTA film to TLDs and is probably a
7 function of the algorithm used to interpret the
8 exposures to the TLD. And also a function of the
9 over-response to thermal neutrons by the TLDs that
10 were used by Pantex in-house in that time period.

11 DR. BUCHANAN: Now, they didn't
12 include any of the calibration when constructing
13 this table. That would be strictly workers'
14 badges. That wouldn't include any of their
15 calibration badges, would it?

16 MR. ROLFES: Calibration badges for --
17 no, unfortunately, we don't have any of the
18 calibration information during this time period.
19 That's one of the, you know, we have bits and pieces
20 of information similar to what I mentioned earlier.
21 We don't have any detailed information on the
22 calibration of this TLD that was used in the

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1 1974/1975 time period.

2 DR. BUCHANAN: Yeah, and those -- what
3 I'm saying is, the data used for that table had
4 workers' names associated with it. It wouldn't
5 have included any of their calibration badges in
6 that to make it retie. I'm just throwing out a
7 theory there.

8 MR. ROLFES: The data that we have
9 available to us is identified with individuals'
10 names, but calibration data is not included in
11 that.

12 DR. BUCHANAN: Okay, that was my
13 question.

14 Well, in the long run, whatever the
15 reason is, it's claimant-favorable, you know, it's
16 high instead of low. And so it's not going to, you
17 know, shortchange anybody when assigning neutron
18 dose. In fact, it'll assign probably excessive
19 neutron dose.

20 I just wanted to see if there was a
21 problem that needed to be identified there. And,
22 so, it sounds like you have, you know, checked it

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1 out pretty thoroughly, so I have no further issue
2 with it.

3 MR. ROLFES: Yeah, I think if you, you
4 know, look at the over-response of this badge, you
5 know, you can say up to a factor of five times
6 over-response to thermal neutrons.

7 And then if we've got a TLD that's
8 over-responding to thermal neutrons, and on top of
9 it we had previously applied that correction
10 factor, because we believed that these doses were
11 recorded by NTA film, so we applied that correction
12 factor of 2.9.

13 So when we look at those two factors
14 combined, that can bring us up close to ten. And
15 some of the other, you know, issues that I had
16 mentioned earlier could have contributed.

17 So, if those factors were to be removed
18 and the over response was corrected, it would
19 probably get us back to the correct value, or close
20 to it.

21 But, yeah, that would not be as
22 claimant-favorable. If we did, you know, dig into

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1 this, it would likely result in a significant drop
2 in the actual doses that we would be assigning to
3 the Pantex workers.

4 DR. BUCHANAN: Okay, I had no further
5 issue with that section.

6 MR. FITZGERALD: Okay, Brad?

7 CHAIRMAN CLAWSON: Yes?

8 MR. FITZGERALD: I can, I think, polish
9 off the last two for the Work Group.

10 Item 3, that was held in abeyance from
11 the Work Group meeting of almost two years ago.
12 And that was essentially a discussion where I think
13 SC&A had suggested that additional language be
14 included in the site description and elsewhere that
15 just kind of highlighted the dose reconstructor
16 that Pantex was one of the sites where they had a
17 number of technical experts that had spent time at
18 the Nevada Test Site, spent time at Sandia and other
19 locations, just because of their expertise on the
20 assembly, weapons assembly.

21 And we felt that wasn't given much, you
22 know, note in those descriptions. And I don't

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1 think there was any disagreement in our discussions
2 with Mark and with the Work Group.

3 So that was just a matter of, perhaps,
4 adding that language in, which we have found it has
5 been added. So we would certainly recommend
6 closure at this point for that item.

7 CHAIRMAN CLAWSON: Okay. Is there any
8 discussion on that for the Work Group? If not,
9 we'll proceed on with that and close it.

10 I do have one question for Mark, and
11 this is just dealing with the TBD. When we started
12 into this many years ago, we collected numerous
13 changes that were going to be made to the TBD.

14 Have those -- and what I'm asking, Mark,
15 is the last time I spoke with you, we had
16 accumulated many of these but we were going to do
17 this in one great big change, is that correct?

18 MR. ROLFES: Yes. And I think we've
19 incorporated the majority of these into our
20 revisions which were published last year, in 2015.

21 CHAIRMAN CLAWSON: Okay. So we have
22 gone ahead and changed. We don't have that many

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1 of them lingering out there, correct? I thought
2 we had changed some to the TBD, but are we looking
3 at that we're going to need any more changes?

4 MR. ROLFES: I don't know, ultimately,
5 if we'll take OTIB-86 once we're in agreement with
6 the neutron dose reconstruction approach. We may,
7 ultimately, take that OTIB and incorporate it into
8 the external dose TBD for Pantex. But that would
9 be the only revision that I can think of at this
10 time.

11 CHAIRMAN CLAWSON: Okay.

12 MR. FITZGERALD: And, Brad, just
13 stepping back a little bit, we certainly had the
14 same question, and we did sort of scrub all the Work
15 Group transcripts and did go back and basically
16 walk down all the TBD issues. And that was the
17 basis for, I think, the TBD matrix of a year or two
18 ago, and we've been working on that. So I think I
19 would agree, I think it's pretty complete.

20 CHAIRMAN CLAWSON: Okay. Yeah, I
21 remember going through that, but I didn't know for
22 sure if we had some that were lingering out there.

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1 And I just wanted to make sure because, actually,
2 when we get Ron's response on Number 2, this will
3 actually close out Pantex.

4 So I just wanted to make sure that we
5 didn't have anything that was floating out there
6 that the Work Group needed to address or push
7 forward with.

8 Other than that, I don't have anything
9 more to go over. Is there anything that any of the
10 other Board Members --

11 MR. FITZGERALD: Well, there's one
12 final item on the matrix.

13 CHAIRMAN CLAWSON: Right.

14 MR. FITZGERALD: The fourth one, we
15 didn't include it on the agenda because, primarily,
16 it was a clarification question. And it has to do
17 with the way tritium was cited in the internal TBD.

18 And I just want to highlight for the
19 Work Group that clarification has been provided.
20 The language has been changed. It was just one of
21 these tweaks where I think, the way it was worded,
22 it didn't appear that the 1989 tritium release was

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1 given as much consideration as it needed be in terms
2 of maximizing tritium dose.

3 And so that language was changed to
4 clarify it, and there is really no issue at this
5 point. It's pretty clear that the timeframes, as
6 well as that particular event, have been addressed.

7 So just to kind of cross the T, those
8 were the four items that were on the matrix. The
9 last two we felt were addressed in the revisions,
10 and we would recommend closure of those last two
11 items. The first two were the ones that were on
12 the agenda that we discussed on neutrons.

13 CHAIRMAN CLAWSON: Okay, thank you. I
14 guess this comes to the Work Group. I have no
15 problems with closing them, but I want to make sure
16 the other Work Group Members are satisfied.

17 MEMBER BEACH: Brad, I have problem
18 closing that either.

19 MEMBER POSTON: No problems for me.

20 MEMBER SCHOFIELD: No problems for me,
21 either.

22 CHAIRMAN CLAWSON: Okay. Well, I have

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1 nothing more to be able to discuss. I'd like to
2 tell everybody I appreciate all the years of work
3 that we've done on this. And I feel good about the
4 end results that we have. I know we've had
5 numerous discussions on everything, but I'd like
6 to tell everybody how much I appreciate their
7 assistance and their help in completing what we
8 have completed.

9 So, with that, I have nothing more, and
10 I think we can adjourn.

11 (Whereupon, the above-entitled matter
12 went off the record at 11:39 a.m.)

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