

1 that this was an issue here involving that
2 individual, you'd never conclude that this was
3 the same individual whose urine was being
4 analyzed. And it clearly does not conform to
5 any ICRP excretion model regardless of which
6 solubility you select.

7 And I was wondering, to what extent
8 when people look at these data for a given
9 individual that, in this case, involves a
10 moment in time a radiological incident. How
11 do you assess that data? Do you apply the
12 highest number and apply the ICRP dose model
13 as incorporated into IMBA? Or do you look at
14 these data and say, well, these somehow don't
15 comply, and do we sidestep the IMBA model?

16 **MR. ROLFES:** As you alluded to in your
17 report, of the individuals that were exposed
18 in the case study that you had selected from
19 the Health Physics Journal, I noted that you
20 had indicated that NIOSH would significantly
21 underestimate potential exposures if we looked
22 at only limited data. However, I do want to
23 make sure that everyone is aware that we do
24 not only select one or two urinalysis results.
25 We will take every single urinalysis result in

1 that individual's file to estimate his dose.
2 And if you do, in fact, take one urinalysis
3 data, that's true. There's going to be a
4 highly uncertain dose estimate with that. We
5 want to take all sources of information that
6 we have for that individual to use for his
7 dose reconstructions.

8 **DR. BEHLING:** Like I said, this is somewhat,
9 you know, and it was in context with that
10 particular article that I looked at others to
11 see, well, how does the ICRP model, and I
12 think in one of the exhibits that I enclosed,
13 there was the ICRP model for, I think in those
14 days it may have even been still classified as
15 Class D, W and Y, and for three different
16 micron sizes.

17 And you see, however, they're
18 superimpose-able. You just have to slide the
19 Y axis up and down to make these basically
20 superimpose. And they all start at the very
21 high end and exponentially reduce in
22 concentrations. And then when I look at some
23 of these data on the same day, and I won't
24 give you the specific numbers again because I
25 don't want to be told to not identify them,

1 but on Day One, one of the urine samples
2 measured excretions in the thousands of
3 micrograms per liter on that very same day.
4 And in a matter of hours I would think it went
5 from thousands to less than ten. And so the
6 question is what does that mean?

7 **DR. ZIEMER:** But the nature of urinalysis,
8 people don't excrete in a nice smooth manner -
9 -

10 **DR. BEHLING:** Oh, I agree with that. It
11 could be 24 hours --

12 **DR. ZIEMER:** -- their liquid intake varies
13 throughout the day, so any tiny thing like
14 that can be very misleading. You have to
15 smooth that over a long period of time --

16 **MR. ROLFES:** Total area under the curve.

17 **DR. BEHLING:** You can go and drink ten
18 glasses of water and --

19 **DR. ZIEMER:** I would be more suspicious of
20 data where the outputs were the same
21 throughout the day. That would look
22 suspicious. The jumping all over is very
23 common in urine analysis.

24 **DR. BEHLING:** Yeah, and I understand that,
25 but the question remains. What do you do? Do

1 you take that first day, the highest, the big
2 data, and say let's put it into our IMBA and -

3 -

4 **MR. ROLFES:** No.

5 **DR. BEHLING:** -- let ICRP dictate?

6 **MR. ROLFES:** No, we take the entire amount
7 of uranium excreted from that incident, the
8 total area under the curve, the total quantity
9 of uranium excreted from the body is used to
10 analyze the intake. Then once we have that
11 data, we essentially, based on the scientific
12 information that we have at hand, we consider
13 multiple solubility classes for the type of
14 uranium for which the person could have been
15 exposed.

16 And we take a look at excretion
17 patterns also and make a claimant favorable
18 assumption regarding the solubility. So that
19 we are essentially assigning a worst-case dose
20 to that individual's organ where the cancer
21 occurred for historical dose reconstruction.

22 **DR. MAKHIJANI:** I have a question about
23 enrichment.

24 **DR. ZIEMER:** Well, I do, too, but go ahead
25 with yours. It may be the same thing.

1 **DR. MAKHIJANI:** Well, last time we discussed
2 the question of production information and the
3 original site profile contained internally
4 contradictory information plus -- Stu
5 Hinnefeld was here, and he said that you had
6 available to you the original ^. So far as I
7 know, the amount of enriched uranium in the
8 1950s were not small. They were in the
9 hundreds or thousands of tons at least. And
10 cumulatively they may have been quite
11 considerable.

12 So I don't think, offhand, without
13 looking at the corrected materials count, I'm
14 not comfortable with the assertion -- at least
15 from everything I know, whatever was
16 classified as enriched uranium is probably
17 about 20 percent of the total Fernald
18 production. The total Fernald shipments are
19 listed in the materials that comes from the
20 1980s as being upwards of half a million tons.
21 And the total enriched uranium shipments that
22 I remember -- I don't have the document with
23 me -- are upwards of 100,000 metric tons.

24 In the 1980s Fernald was processing
25 primarily depleted uranium if memory serves me

1 right. And so the enriched uranium would have
2 been focused in the '50s, '60s and '70s.

3 'Seventies production was quite low, so we're
4 talking primarily about the '50s and '60s. So
5 I think settling this question of enriched
6 uranium, and I think we can't just toss a one
7 percent number at it without actually looking
8 at the materials and counting data that is
9 available.

10 I'm not at all confident, especially
11 in face of the fact that the TBD numbers, some
12 of them, are certainly wrong because they're
13 internally contradictory. They don't add up.
14 The recycled uranium number in the TBD is more
15 than the total uranium, one of the total
16 uranium numbers in the TBD. So something is
17 definitely wrong.

18 So I'm not comfortable with any
19 resolution of this question until there are
20 some clear data on enriched uranium. Because
21 I happen to be quite familiar with these
22 numbers, and I know that the numbers on the
23 table are not right.

24 Secondly, I think there would need to
25 be some, some of the numbers are not right.

1 That's certain. There would need to be some
2 demonstration I would think that since upwards
3 of five percent uranium was used since we're
4 not talking about an SEC, but you are covering
5 the class with two percent.

6 And I haven't personally heard an
7 argument, I would readily agree that a two
8 percent assumption would be claimant favorable
9 for, if you're just saying as a population. I
10 have no problem with that, and I think
11 actually we said that in our site profile
12 review. I don't think that is an issue. I
13 think that's quite clear if you look at the
14 overall production.

15 However, in an SEC context and we had
16 this discussion the last time, I think sort of
17 hand waving we're comfortable that it's okay,
18 and the individuals that we have looked at are
19 not, you know, more than two percent is not
20 justified. At least I'm not clear that it
21 meets the charge that we have in our criteria
22 for looking at evaluation reports.

23 **MR. ROLFES:** For the enrichments in the
24 early time period, Fernald referred to
25 enriched uranium as anything which exceeded

1 the natural isotopic composition of uranium,
2 anything above 0.71 percent. So as a matter
3 of record Fernald had to refer to uranium
4 which was 0.73 percent, only two one-
5 hundredths of a percent higher than U-235
6 content, as enriched material.

7 So they reported, so, yes, that is
8 very possible that 0.71 percent or 0.72
9 percent was the majority of the product there.
10 However, if it exceeded 0.72 percent, it was
11 reported as enriched material. Our one
12 percent default will bound the enrichments for
13 the greatest majority of the materials
14 produced in that time period, and likewise for
15 two percent.

16 So, yes, we have reviewed many source
17 documents. We've conducted interviews in this
18 regard, and I believe we have provided some of
19 those interviews but not a complete set.

20 **DR. MAKHIJANI:** Is there the production data
21 that you reviewed on the O drive? I mean, I
22 can't, it's impossible to look at the
23 reference material on the O drive because it
24 has no titles, only numbers to the documents.
25 And one doesn't know what to open in order to

1 prepare for this.

2 **MR. ROLFES:** I was able to find them.

3 **DR. MAKHIJANI:** Well, of course we can find
4 them if we open 70 documents and then you've
5 got to keep track. You have to --

6 **MR. GRIFFON:** Maybe we can cross-reference
7 on the matrix just to make it easier for the
8 future.

9 **MR. ROLFES:** Sure, sure.

10 **DR. BEHLING:** Yeah, and just to, on page 32
11 of our review, there is an exhibit, actually
12 Attachment 4.1-4A. And if you go to page 32,
13 I'll just read you a statement for those who
14 may not have access to the report. But it
15 says projected and anticipated U-235
16 enrichment process -- and this is an inhouse
17 document.

18 And it says, "Discussions with the CAO
19 and NLO personnel have indicated that the ^
20 process, cold fuel from several reactor sites
21 including Hallam, Bonus*, EGCR, Piqua and
22 perhaps from Savannah River, significant
23 portion of fuel will range from three percent
24 to seven percent U-235 enrichment. In this
25 regard a campaign is scheduled to begin

1 February '69." So they're talking about
2 significant quantities of fuel that will have
3 enrichments of ^ percent.

4 **MR. ROLFES:** Sure, that's very true. Under
5 the commercial assay program during the 1970s,
6 there were some high enrichments material that
7 were brought into the site. And this is
8 during the time period that the whole body
9 counter was operating, in fact. So we have
10 information regarding isotopic content for
11 those who were exposed to this uranium.

12 Furthermore, we do have documentation
13 of individuals that were involved in the
14 Hallam Reactor Project. And we have provided
15 that information to the Advisory Board for
16 their review as well as prepared a sample dose
17 reconstruction for one of those individuals
18 that were involved.

19 And based on the information it does
20 say that these individuals were, in fact,
21 working on two enrichments with the Hallam
22 Reactor elements. We know that they were
23 working with 4.9 percent enrichment and 6.5
24 percent enrichment. And when we looked at
25 their urinalysis data, we estimated an intake

1 based on those two enrichments. I think we
2 actually used the bounding enrichment of 6.5
3 percent.

4 However, when we looked at all the
5 sources of data, when we considered their in
6 vivo data, we could not confirm, because we
7 could not confirm that these individuals were
8 solely exposed to the 6.5 percent enrichment
9 because their lung counts would have been
10 very, very high. Our urinalysis data way
11 over-predicted -- excuse me. Our intakes
12 based on the urinalysis data way over-
13 predicted the observed mobile in vivo lung
14 count data.

15 **DR. BEHLING:** Well, I would expect that your
16 lung count data would be more indicative of a
17 recent exposure as opposed to urine which can
18 be from years and years ago. It's an
19 integrated exposure that covers many years
20 realizing that it may be released from bone
21 tissue that was deposited many years ago as
22 opposed to a lung even if it's fairly
23 insoluble. It may have a relatively shorter
24 time period or life span in the lung as
25 opposed to in the matrix of the bone tissue.

1 So my gut feeling is if you looked at
2 the mobile in vivo lab data, you would
3 probably have a better indication of exposure
4 to a higher, a more enriched -- I won't say
5 high enriched -- more enriched uranium as
6 opposed to urine data. So the two may not be
7 compatible.

8 **MR. ROLFES:** The two are compatible and are
9 used as, you know, we have to consider all
10 evidence. We can't selectively choose one
11 piece of information that contradicts another.
12 We have to incorporate all information that we
13 have for an individual.

14 Go ahead, Mark.

15 **MR. GRIFFON:** I just wanted to clarify your
16 follow-up response in the matrix. It says,
17 "Higher enrichments were handled as special
18 projects and some people directly involved are
19 identifiable from the dosimetry data, work
20 locations and telephone interviews allowing
21 bounding calculations to be done."

22 When I read that I thought, I mean,
23 the question for me, some words jump out, work
24 location, some. Some tells me not all
25 probably. And then allows for bounding

1 calculations to be done told me that that was
2 different than your two percent default. But
3 now you're saying -- I guess, are you saying
4 that you've looked at these cases, this list
5 of people, and determined that even, and this
6 is the sample that you gave us that you
7 provided? That sample DR demonstrates that
8 even using the 6.5 for this particular
9 individual, looking at all the other in vivo
10 data available, couldn't justify that they
11 were only exposed to the 6.5 material? Is
12 that --

13 **MR. ROLFES:** Correct.

14 **MR. GRIFFON:** -- therefore, when you say a
15 bounding calculation can be done, it should
16 say -- well, I don't know. Are you saying
17 using the default enrichment values?

18 **MR. ROLFES:** I'm not sure of the question.
19 Could you clarify? I'm sorry.

20 **MR. GRIFFON:** I guess I'm saying you're
21 saying that you picked out this one sample,
22 and their in vivo couldn't support using the
23 high enrichment level. Certainly you didn't
24 go through this entire list and check that
25 kind of thing. I wouldn't --

1 **MR. ROLFES:** Oh, no, no, no, we didn't ^ for
2 everyone onsite, no.

3 **MR. GRIFFON:** But you've made this argument
4 that we have one individual off this list that
5 worked with this high enrichment material
6 documented in this list. And we compared the
7 situation, and we can't support using a higher
8 enrichment value for this case. And
9 therefore, for any other case? Or is it
10 individual specific or --

11 **MR. SHARFI:** You'd have to consider the
12 specific scenario of the different claimant.

13 **MR. ROLFES:** Sure, this certainly has to be
14 done on a case-by-case basis. We cannot,
15 without looking at the data, I could not make
16 --

17 **MR. GRIFFON:** So for each case you'd go and
18 look at the in vivo, and if there's any
19 indication that there might have been enriched
20 work based on ratios, but in a lot of cases
21 you're not going to have positive values so
22 how are you going to --

23 **MR. ROLFES:** Well, if we don't have a
24 positive value --

25 **MR. GRIFFON:** You default to your two

1 percent?

2 **MR. SHARFI:** Just because you don't have
3 positive values doesn't mean you --

4 **MR. GRIFFON:** I'm just trying to understand
5 the decision process.

6 **MR. SHARFI:** So I mean, if you ^ six and a
7 half percent off the urine, you may or may
8 not, depending on the size of the urinalysis
9 results, expect positive chest count. So it
10 may fit or it may not fit --

11 **MR. GRIFFON:** So to follow up on the may or
12 may not, if you don't have the in vivo data,
13 then how do you decide?

14 **MR. ROLFES:** If we have an individual that
15 we know, based on documentation ---

16 **MR. GRIFFON:** Whoa, whoa, whoa, based on
17 documentation, what documentation? What does
18 that mean? You know, job title, work
19 location? What was the --

20 **MR. ROLFES:** Well, plant one was one of the
21 locations that had the majority of the
22 enrichment. There are some people that had
23 been exposed to higher enrichments in plant
24 one, and those individuals are identified by
25 breathing zone samples. And we have

1 information regarding air concentration data.
2 We have information regarding uranium mass
3 data in the air.

4 So from that -- and we also do have
5 their swipe samples taken associated with
6 those results. Now keep in mind that these
7 are very short campaigns involving one or two
8 people, so I want to make sure that we're
9 clarifying. We're not discussing a very large
10 population of people. These individuals are
11 identified by breathing zone sample results
12 and the enrichment. And I have observed some
13 enrichments of about three percent, 3.5, 3.9
14 percent on a very short campaign basis.

15 However, these individuals were also
16 monitored by the in vivo about two years later
17 so we'd still be able to, if there were
18 significant exposures, we'd still be able to
19 make some inference based on the data about
20 what isotopic content they were exposed to
21 previously.

22 But the great majority -- and these
23 were the people that were working with
24 enrichments that exceed our default of two
25 percent in that time period. There were not a

1 significant amount of, there was not a
2 significant amount of uranium which exceeded
3 our defaults in the technical basis document.
4 And for those people that did exceed it, we
5 believe we have data that we can use to bound
6 their doses.

7 **MR. GRIFFON:** And you're talking ones and
8 twos, not tens and twenties of people. I
9 don't know enough about --

10 **MR. ROLFES:** Sure, based on the information,
11 for example, there were a couple of short
12 campaigns in plant one that I saw some
13 receipts of materials. People had breathing
14 zone samplers on, and there was information
15 regarding the enrichment. And it was
16 approximately a week for the one operation,
17 and then another week later on in the year
18 involving the same person.

19 **MR. CLAWSON:** What about the maintenance
20 people and stuff that would have to go into
21 those because some of the information that
22 I've read on these plants, they had an awful
23 lot of problems. In fact, they were even shut
24 down numerous times. So now you've got a
25 whole 'nother revolving group that's going to

1 be rotating through there.

2 **MR. ROLFES:** Certainly, that is very true
3 that people did go in and out of the plant;
4 however, if you take a look, these individuals
5 didn't work just on this enrichment. These
6 individuals would have been working in other
7 plants that were handling other enrichments,
8 mostly which would have been natural uranium
9 or something below our default of two percent
10 at the time.

11 So these individuals would, in fact,
12 be exposed to natural uranium for 50 weeks out
13 of the year, and could have potentially been
14 exposed to the three percent enrichment on a
15 very limited basis for a week or possibly two
16 weeks. So it is possible. We cannot say that
17 with 100 percent certainty that an individual
18 was not exposed to this higher enrichment. It
19 is very possible, but it is very, very
20 limited.

21 So does that answer what you're --

22 **MR. CLAWSON:** Well, I just -- yeah, they may
23 have been there, but you're digging for this
24 one person. You've got a lot of breathing
25 zones and everything else, but you don't have

1 it for these other people going in and out
2 that are actually, actually going to be right
3 up there, hands on and --

4 **MR. ROLFES:** Certainly, just like chemical
5 operators were. These individuals we also, we
6 do have mobile in vivo data for these
7 individuals as well. So maintenance people
8 were included in the schedule for receiving
9 monitoring from the mobile in vivo unit. So
10 if, once again, there were significant
11 exposures to this very limited operation, if
12 they had a significant exposure, it would be
13 detectable in the mobile in vivo units.

14 **MR. CLAWSON:** You were talking about the
15 enrichment and stuff, now were they able to
16 actually enrich it up to the three percent at
17 Fernald or were they blending other uraniums
18 in?

19 **MR. ROLFES:** In the later years, I believe
20 in the '60s, they did begin receiving some
21 uranium back, recycled uranium, from Hanford
22 which typically had an isotopic content of
23 around 0.8 percent. That material -- I guess
24 I'll probably ask Bryce to give us a little
25 bit more detail about that.

1 Bryce, I wondered if you could explain
2 a little bit about the receipt of, now the
3 three percent material was not used in this
4 early time period for blending. Typically, in
5 the earlier time periods, I'd like to ask
6 Bryce to comment on this because there was a
7 limit to which assay of U-235 Fernald could
8 use for blending, and that was typically about
9 two percent enrichment I believe. And that
10 came in as UF-6 from the gaseous diffusion
11 plant. However, there was also material that
12 came in from Hanford that was about 0.8
13 percent enrichment, and that was used and
14 blended I believe.

15 Bryce, could you elaborate on the
16 process a little bit about the blending of the
17 use of one slightly higher assay such as 0.8
18 percent or 1.25 percent enriched uranium to
19 sweeten or enrich the isotopic content of
20 natural uranium? Would you care to elaborate,
21 please?

22 **MR. RICH:** My understanding, and we have the
23 experts in the room that actually did that,
24 but there was an accounting restriction from a
25 cost standpoint. Higher enrichments were

1 accounted for very rigorously and, in fact,
2 were, had to be blended on a teaspoon basis as
3 opposed to a reasonable blending on a pound-
4 per-pound basis to blend up to a certain
5 level.

6 So the blending was done with
7 materials that matched more the, a slight
8 blending up to the level that could be done
9 more accurately in order to blend materials in
10 a blending machine. If you blend a teaspoon
11 with a ton, why you had to blend more
12 carefully in order to get the entire lot
13 blended to a certain amount.

14 However, in addition to that the
15 accountability rules prevented higher
16 enrichment. Normally, they were sent back to
17 the gaseous diffusion plants because they
18 weren't good blending material. So they were
19 just temporarily, or some of the campaigns for
20 the Hallam fuel, for example, was recovered in
21 a special campaign but not used for blending
22 immediately. There was an inventory that was
23 stored at the plant temporarily and not used
24 for blending because it was at the higher
25 enrichments where they couldn't afford the

1 price associated.

2 And as a matter of fact, certain
3 blends of certain enrichments had to have not
4 only upper management approval at the site but
5 had to have AEC approval in order to use that
6 material. It cost a lot of money to blend it
7 up to a very high enrichment, and so you just
8 didn't casually use that to blend up to the
9 1.25 to two percent that was used in the
10 routine reactor fuel.

11 And I'm not sure if that answers
12 specifically the issue associated with the
13 blending and the use of higher enriched fuels
14 or high enriched uranium or blending material.

15 **MR. GRIFFON:** Was that all done in Building
16 1, the blending operation would have been done
17 there, too?

18 **MR. RICH:** There was some blending in four.

19 **MR. KISPERT:** Right, and then refined in
20 plant two and three where most of it was done.
21 And plant four also did dry blending, powder
22 to powder. Plant two and three did liquid
23 blending as uranyl nitrate solution.

24 **MR. GRIFFON:** So these different emissions
25 were not just in one, right?

1 **MR. CLAWSON:** The reason I bring this up is
2 because going through some of our data in
3 Idaho, we sent some of our processed over to
4 see if they could blend it. And I guarantee
5 you that wasn't two or three percent. Much,
6 much higher. That's why I'm having this
7 issue.

8 **MR. RICH:** The material from Idaho, however,
9 most of it went to Y-12, and it was used
10 primarily at Savannah River driver fuel. A
11 little bit went to Rocky, and some others went
12 to the Portsmouth Gaseous Diffusion Plant.
13 But I'm not aware that they sent any to
14 Fernald.

15 **MR. CLAWSON:** Well, in going through some of
16 our data, we gave, the earlier years they took
17 some of the 601 process material to see if
18 they could blend it, and my understanding of
19 the records that we showed was that it didn't
20 work out so well because of, it was too highly
21 enriched.

22 **MR. RICH:** You can't blend a teaspoon at a
23 time. That's just what it amounts to. You
24 have to blend forever in order to get mixing.

25 **MR. CLAWSON:** That's when they were trying,

1 my understanding was in the powder form where
2 it was a little bit more, but it was too
3 highly enriched to go.

4 **MR. RICH:** Early on in the Idaho campaign
5 they shipped as liquid, but then that stopped
6 shortly or thereafter because of safety
7 issues. They simply didn't want to ship these
8 uranyl nitrates because the nitrate had been
9 sent as powder. But even as liquid the
10 blending is still a problem. Precise
11 measurements, for example, to get a precise
12 total batch enrichment is a problem.

13 **MR. CLAWSON:** Well, and see, this is kind of
14 one of my issues is, and I've said this
15 before, all these sites are integrated in one
16 way or another. And a lot of times this stuff
17 isn't really documented that much. This is
18 why when you start getting into the enrichment
19 and this and that, I can guarantee what came
20 from Idaho was a lot more than that.

21 And in reading it, and it might have
22 been for just a short period of time there
23 because my documentation that I ran into and
24 stuff said that, just what he said. It was
25 too highly enriched. They were looking at

1 some other fuels, but they only did the very,
2 very high fuel amounts. And I believe it did
3 go on to Oak Ridge and Savannah River to be
4 able to be split up.

5 **MR. RICH:** Yeah, they decided very early on
6 and shortly after 1953 that Savannah River was
7 coming up about the same time, and they were
8 going to use highly enriched driver fuel. And
9 in that case the highly enriched stuff in the
10 75 percent plus range would serve well for
11 that. And so most of it was used for that
12 purpose, and it went to Y-12.

13 **MR. KISPERT:** We did not normally receive
14 from Idaho. They were not part of the Fernald
15 circle.

16 **MR. RICH:** I'm not aware that any Idaho fuel
17 went to Fernald.

18 **MR. KISPERT:** No doubt were shipments made
19 from INEL that were experimental, but they
20 would be non-routine, non-recurring.

21 **MR. CLAWSON:** But you did receive some?

22 **MR. KISPERT:** I have no doubt that to my
23 recollection, yes, we did from INEL.

24 **MR. CLAWSON:** And I read a little bit of the
25 history, and basically, it was too far up

1 there to be able to bring it down. They were
2 looking at being able to use this uranium to
3 be able to help the process along, but it had
4 already been cleaned up way too far to make
5 it. I just, when they start to say out to me
6 that we never had anything over three percent
7 enrichment, then I start reading these
8 documents.

9 **MR. ADAMS:** We did not have anything above
10 20 percent. That was our absolute limit, the
11 material. And there was very little of that
12 material. The material was in that five-to-
13 six percent range.

14 **MR. KISPERT:** The receipts that we got from
15 Y-12 were all, most of them were blended.

16 **MR. CLAWSON:** We need to get you to
17 introduce yourself.

18 **MR. KISPERT:** Oh, Robert Kispert.

19 **DR. ZIEMER:** Mark, could I have you clarify
20 in the NIOSH statements where you say higher
21 enrichments were not processed until the mid-
22 '60s, you mean higher than two percent or
23 higher than natural levels?

24 **MR. ROLFES:** No, there were some that
25 exceeded natural levels.

1 **DR. ZIEMER:** But not two percent?

2 **MR. ROLFES:** Well, there may have been on a
3 very limited, for example, in 1965 there were
4 a limited number of people --

5 **DR. ZIEMER:** ^.

6 **MR. GRIFFON:** Just ^ your phrase in your
7 resolution.

8 **MR. SHARFI:** For one percent ^.

9 **DR. ZIEMER:** I'm trying to get a feel for
10 whether two percent is bounding in terms of
11 the absolute records, or if it's bounding in
12 terms of, as I understand it, if you had an
13 individual whose record showed that they
14 worked at -- I don't know, pick a number, four
15 or five percent -- you could actually
16 reconstruct on that basis for that period if
17 you knew when it was.

18 And I think what you're saying is if
19 you assumed it was two percent for their whole
20 time, the final number you would come up with
21 would be at least as great as if you took the
22 0.7 percent and then the little period when
23 they worked with higher, and then --

24 **MR. ROLFES:** I certainly am fully confident

25 --

1 **DR. ZIEMER:** Is that --

2 **MR. ROLFES:** I certainly feel that applying
3 two percent would bound a person's integrated
4 exposure over their career. I'd certainly
5 feel that --

6 **DR. ZIEMER:** But for those who had higher
7 you could actually do the reconstruction for
8 the period for which you knew --

9 **MR. ROLFES:** Oh, certainly, certainly,
10 certainly can. However, we would --

11 **DR. ZIEMER:** And in the sample you're just
12 saying that you can show the two percent
13 bounds even those for whom you have the data.

14 **MR. ROLFES:** Exactly, the mobile in vivo
15 data.

16 **DR. ZIEMER:** Because if you're going to
17 reconstruct it exactly, you'd use the 0.7 and
18 then whatever enrichments.

19 **MR. ROLFES:** Exactly.

20 **DR. ZIEMER:** And the two percent so far has
21 bounded all of it.

22 **MR. ROLFES:** Yes, certainly.

23 **DR. ZIEMER:** You're not saying you tried
24 everyone.

25 **MR. ROLFES:** That's correct. Two percent

1 has defaulted.

2 **DR. ZIEMER:** And in the absence of knowing
3 that they worked with something or else, the
4 two percent would seem to, you could make the
5 case that that works.

6 **MR. GRIFFON:** That's the case they're making
7 actually.

8 **DR. ZIEMER:** And like any assumption you can
9 always argue that there might, there could
10 have been someone --

11 **DR. BEHLING:** A short-term employee who
12 happened to get the six percent.

13 **MR. ROLFES:** But that's very unlikely.

14 **DR. ZIEMER:** Well, you still have urine data
15 for those in any event, do you not?

16 **MR. ROLFES:** I'm sorry?

17 **DR. ZIEMER:** Are there people for whom you
18 don't have the urine data?

19 **MR. ROLFES:** I believe approximately 93
20 percent, off the top of my head, had
21 urinalysis data. And for those that don't, we
22 do have a coworker model.

23 **MR. SCHOFIELD:** How often was urinalysis
24 done and in vivo counting done for these
25 people?

1 **MR. ROLFES:** I think I can reiterate that
2 some people were monitored, there's some
3 people that were monitored in the number of
4 tens of times per day. Some people that were
5 not working in radiological areas were only
6 monitored on an annual basis. So for example,
7 if there was an incident, for example, 1966
8 there was a UF-6 release. There are people
9 that were involved in this incident that were
10 monitored. If you take a look, there are some
11 people that were monitored more than ten times
12 in that one day. So I think there's --

13 **DR. BEHLING:** So I think the question
14 centers more around routine monitoring as
15 opposed to incident-related monitoring.

16 **MR. ROLFES:** It would vary based upon
17 previous exposures, what their actual urine
18 data say, based on any incidents. For
19 example, if the person felt that he had been
20 exposed, he could go request a urine sample as
21 well. So without, you know, I don't want to
22 make some broad statement. I'd have to take a
23 look at what the person did. For example, a
24 person that had the higher potential for
25 exposure would certainly be monitored more

1 frequently.

2 **DR. BEHLING:** And I looked at some of the
3 procedures. We'll get into that I think in
4 the next Finding, but it changed over time. I
5 mean, you look at procedures as they evolved
6 over time, and you realize that the frequency
7 increases.

8 **MR. RICH:** And indicate that the sampling
9 procedure was ^ elucidated in procedural form.

10 **DR. ZIEMER:** Can I also ask for clarity on
11 Arjun's statement on the masses and your
12 statements on, we have pretty good records on
13 what came in as I understand it. And the
14 large masses that you mentioned, is a lot of
15 that accounted for stuff that was just over
16 the 0.7?

17 **MR. ROLFES:** That was exactly what it is,
18 yes.

19 **DR. ZIEMER:** Does that agree, I know you had
20 a report that occurred in the '80s sometime,
21 you and some colleagues did, did you have some
22 inventory data there that somehow is different
23 from what they're saying on this?

24 **DR. MAKHIJANI:** Dr. Ziemer, last time when I
25 raised this, I had referred, and also in our

1 site profile review in the production numbers,
2 we referred to the original material accounts
3 that Fernald filed with the AEC and the DOE.
4 And in those accounts, at least the ones I'm
5 familiar with, there were only three
6 categories. It said depleted, normal and
7 enriched. They don't actually tell you the
8 enrichment only subject to limitation for the
9 site that it was under 20 percent.

10 **DR. ZIEMER:** Yeah.

11 **DR. MAKHIJANI:** And we know that, so far as
12 my memory serves me, that enriched uranium
13 cumulative over the site's history was very
14 significant. It was not the majority, but it
15 was over 100,000 metric tons, and it was being
16 reported in the mid-'80s.

17 **DR. ZIEMER:** Yeah, but I'm sort of asking
18 was 99.9 percent of that barely over or do we
19 know?

20 **DR. MAKHIJANI:** It might have been one
21 percent.

22 **MR. RICH:** Let me just comment there. In
23 the original technical basis document there's
24 a section dealing with recycled uranium. And
25 those numbers -- and that came directly from

1 AEC's extensive, or DOE's at that time,
2 extensive mass balance report dealing
3 specifically with recycled uranium.

4 Those numbers were reported in the
5 technical basis document, and they disagree
6 with the total production at the site
7 primarily because in the early days, they
8 processed the African ^ ores. And then later
9 on they processed U3OH straight out of the
10 uranium mills in the U.S. production program.
11 So they were processing a tremendous amount of
12 uranium that will bring, so those will
13 conflict with the recycled uranium.

14 But it was reported in the technical
15 basis document as a consequence of the fact
16 that the recycled uranium was used and blended
17 and transferred back and forth between sites.
18 DOE recognized there was discrepancies in that
19 mass balance report between sites. The
20 secondary transfers, for example, exceeded
21 that that came directly from the primary
22 chemical processing site. And so they
23 resolved, two years later the Department of
24 Security issued another report which clarified
25 the primary shipment.

1 So, indeed, yes, there are some
2 discrepancies between reports. But again, I
3 guess I think we are in the new technical
4 basis document for clarifying some of that,
5 but there still will be some discrepancies.
6 That doesn't deal directly with dose
7 reconstruction, however, but it does give you
8 an idea of what happened at the plants and I
9 think that material is there and effective.

10 **MR. GRIFFON:** One thing I wanted to ask was
11 the follow up. Stu did mention in the first
12 meeting we had of some documentation that
13 would support, you know, clarify this maybe.

14 **MR. RICH:** Yes, there are some documents.

15 **MR. GRIFFON:** Is this, I mean in number two
16 here, action item, you have this Bogar 1986
17 report. Is that going to address -- so I
18 think if I can add on just to move this
19 discussion along, I was proposing that a
20 follow-up action needs to be done on SC&A's
21 part. That SC&A needs to review the sample
22 case that you alluded to in your number three
23 here, response number three, along with the
24 default approaches of one percent and two
25 percent for pre-1964, post-1964. And SC&A

1 will also include review of the Bogar 1986
2 document in this process. That answers kind
3 of one, two and three at least here on our
4 actions.

5 **DR. MAKHIJANI:** Just for clarification about
6 that task. The Bogar series of documents, you
7 know, there were five periodically, maybe even
8 monthly. I don't remember. They don't
9 contain any data on enrichment levels, so we
10 won't, we just have these three categories,
11 enriched, normal and so we won't be able to
12 resolve the one percent, two percent, ten
13 percent, five percent without -- and that's
14 the problem I'm having with this is being
15 familiar with, there's a mass of information
16 that tells you enriched or not enriched.

17 And we know that a lot of the enriched
18 dealt with Hanford reactors, so it was likely
19 to be low enriched, in the lower, less than
20 two percent range. So that's what I said. As
21 a general matter, two percent if you say would
22 apply comfortably to the vast majority of
23 workers, this is good. I think that
24 everything we know about Fernald says that
25 this is good. The people who worked there

1 would maybe affirm that.

2 What I'm concerned about is if you
3 have a small batch of 15 percent or 19.9
4 percent, the isotopic composition is so
5 completely different here. Urine-specific
6 activities that are 30 times, 25 times more
7 than natural uranium and very much higher than
8 two percent uranium that somebody who worked
9 there for a couple of years who did that
10 mostly could be, some burden remains. So I
11 don't know how we could carry out this task
12 that you've just said without more data from
13 NIOSH.

14 **MR. ROLFES:** Fernald's Health and Safety
15 individuals did recognize that higher
16 enrichments were brought into the site and
17 focused on those exposures. If you take a
18 look at one of the documents I provided, there
19 were adjustments to the individuals who had
20 worked on the Hallam fuel elements of higher
21 enrichments. There were adjustments to their
22 maximum permissible exposure, the maximum lung
23 burden data with the specific activity of the
24 materials that they processed. So they did,
25 they were aware of who was, in fact, working

1 with these materials.

2 **DR. MAKHIJANI:** Mark, my statement did not
3 revolve around whether Fernald was being
4 careful or not. It was just Mark Griffon
5 assigned us a certain task, and I don't know
6 how to be responsive to that because we don't
7 have the documents.

8 **MR. GRIFFON:** Well, I wasn't sure what the
9 Bogar 1986 document had in it.

10 **DR. MAKHIJANI:** The Bogar 1986, I have that
11 document.

12 **MR. GRIFFON:** I guess the follow up is, you
13 know, I think we need to, or NIOSH needs to
14 provide whatever they used to make, and maybe
15 it was the interviews that you said you still
16 are working on transcribing, to support your
17 statement that a lot of it was just barely
18 above 0.7, you know.

19 **MR. RICH:** And it's extraordinarily
20 expensive. Accounting was severe. When you
21 get something worth more than gold, you don't
22 let flakes of that lie around.

23 **MR. GRIFFON:** So I guess the back up
24 document to support those default arguments
25 and then this review of this case I think,

1 the room that they've provided us this
2 example, I think we should all reflect on it
3 and make sure that we're in agreement with
4 this.

5 **DR. MAKHIJANI:** I just want to clarify my
6 end of the conversation. From my point of
7 view, and maybe Hans misunderstood. From my
8 point of view I was just reiterating what I
9 said in the formal meeting on the record,
10 which is I've no doubt that overall these
11 assumptions are claimant favorable for the
12 vast majority of workers. But I have some
13 concerns in the SEC context which is more
14 rigorous than doing claimant favorable dose
15 reconstructions. I do think they need to be
16 reviewed, so in my opinion which I said in the
17 first part of the meeting. I think maybe Hans
18 misunderstood what I had, what the intent of
19 my statement was.

20 **MR. GRIFFON:** If I can, I can read out what
21 I had sort of as an action, and it covers, I
22 didn't really put it down for NIOSH's Response
23 1 or Response 2, but it sort of covers one,
24 two and three in that first set of responses
25 at least. And I suggested that SC&A sort of

1 review sample case along with default
2 approaches, one percent and two percent.

3 SC&A will also include a review of the
4 Bogar 1986 document although, as Arjun said,
5 it may not answer some of those questions.
6 NIOSH to provide documentation to support the
7 statement that most of the enriched material
8 was very slightly enriched, slightly greater
9 than 0.71 percent U-235. And that's what I
10 have just as follow-on actions here.

11 **DR. ZIEMER:** Good, I'm just looking at the
12 SC&A report, and they give the Bogar numbers
13 for the categories, so I'm not sure what we
14 would gain because you've already indicated
15 that he doesn't provide further detail than
16 that.

17 **DR. MAKHIJANI:** No, Dr. Ziemer, what I was
18 looking for in terms of just trying to respond
19 to Mark's tasking here is more detail as he
20 has just stated --

21 **MR. GRIFFON:** Yeah.

22 **DR. ZIEMER:** But I think the Bogar --

23 **DR. MAKHIJANI:** -- the Bogar is not
24 relevant.

25 **MR. GRIFFON:** It's probably not as relevant.

1 **DR. ZIEMER:** Well, I'm saying the Bogar
2 numbers are in their report, and I don't think
3 it answers the question.

4 **DR. MAKHIJANI:** Yeah, the Bogar numbers are
5 only relevant so far as the total amounts of
6 the three categories and sorting out the TBD -
7 -

8 **MR. GRIFFON:** So as far as the task, I'll --

9 **DR. MAKHIJANI:** -- because there are some
10 errors and sorting out the errors in the TBD
11 the Bogar documents are very appropriate.

12 **MR. GRIFFON:** So as far as the task I'll
13 drop that Bogar review from that task,
14 otherwise I'll leave it the same.

15 **DR. BEHLING:** Well, let me just go back and
16 then if the Bogar document is insufficient to
17 look at the sample cases and how do you judge
18 the validity of the two cases, one percent,
19 two percent, in the absence of more definitive
20 data?

21 **MR. GRIFFON:** Well, I think the example is
22 for an individual that you knew worked on a
23 certain campaign, so you have knowledge that
24 they worked with enriched material. And
25 they're saying that even though he worked

1 during for a short campaign on this six
2 percent -- whatever it was -- 6.5 percent
3 enriched, it turns out looking over all at
4 this cumulative dose, the in vivo more than
5 bounds it and two percent probably would have
6 been sufficient.

7 So I guess that's the context in which
8 I would review it is to say, yes, they have,
9 using the in vivo and the urinalysis do they
10 have enough there to bound and is two percent
11 bounding for all members of the class? I
12 think we go back to that all members of the
13 class statement. That's what you want to
14 answer.

15 And part of that is, I think, it might
16 get into this action item number four, but
17 part of it is the, I think in my mind anyway,
18 the size of these campaigns. Because before I
19 came to this meeting, I wasn't sure. And the
20 way they're being characterized, it seems that
21 they're much smaller than I was envisioning.

22 And the other part is the who
23 question. Can you identify either through
24 dosimetry data or other pieces, do you have
25 enough there to allow you to bound? Does that

1 make sense, Hans?

2 **DR. BEHLING:** Yeah, I haven't looked at
3 those cases specifically.

4 **MR. GRIFFON:** Neither have I.

5 **DR. BEHLING:** So I don't know what's in
6 there.

7 **MR. GRIFFON:** I'm just going by what's
8 described here so I haven't looked at that
9 case either.

10 **DR. ZIEMER:** Mark, as I understood it
11 though, if you had a case such as Hans
12 described, some individuals who only worked on
13 campaigns with high enrichments for restricted
14 times, you wouldn't have to go to the overall
15 bounding. You could bound that individual
16 base on the actual percentages which would
17 meet the other side of the SEC criteria.

18 **MR. GRIFFON:** But if they were identified as
19 working on the project.

20 **MR. ROLFES:** Once again, for example, in
21 1964 we have breathing zone samples for
22 individuals that were working 3.5, 3.9 percent
23 enrichment. That information would be used in
24 their dose reconstruction if we didn't have
25 mobile in vivo data.

1 **MR. GRIFFON:** So you have some isotopic BZA
2 analysis?

3 **MR. ROLFES:** It's not isotopic, but what was
4 done was they would take an activity
5 measurement as well as a mass measurement as
6 well as some swipes to determine the specific
7 activity of the materials. And it would
8 indicate that higher assays were being
9 processed or higher assay work was being
10 completed.

11 **DR. MAKHIJANI:** Now this second case is a
12 real worker with real data or --

13 **MR. ROLFES:** Oh, certainly.

14 **MR. SHARFI:** Modified a little bit to
15 protect the individual's ^.

16 **DR. ZIEMER:** Does that one go on the O drive
17 did you tell us or --

18 **MR. ROLFES:** Well, this is air monitoring
19 data that I'm referring to. What Mutty I
20 think was referring to was the actual mobile
21 in vivo data that was used in the analysis of
22 the 6.5 percent enriched internal exposure
23 model.

24 **DR. MAKHIJANI:** Mutty, which case number is
25 it? Do you remember?

1 **MR. SHARFI:** Actually, it's not a claimant.

2 **DR. MAKHIJANI:** Sorry?

3 **MR. SHARFI:** This was not a claimant.

4 **DR. MAKHIJANI:** No, no, but which example
5 dose reconstruction --

6 **MR. ROLFES:** I believe it's internal 14.

7 **MR. GRIFFON:** And then, Brad, if I can go
8 on, on number four I just had a question.
9 Really this gets back to the who question, but
10 just a question for Mark on what actually does
11 his response mean. We have a list of people
12 with thorium working locations and in vivo ^,
13 and then his provided response a list of
14 workers with Uranium-235 and ambient
15 environmental dose^ of at least 100 micrograms
16 ^. Those aren't separate lists, are they?
17 Are they the same --

18 **MR. ROLFES:** They're separate lists. Yes,
19 they are.

20 **MR. GRIFFON:** Oh, they are? Okay. So why
21 was this first sentence included as an action
22 for this Finding? I'm just a little confused.

23 **MR. ROLFES:** We had asked about the
24 assumptions to apply to the entire class. We
25 basically, this was just a lump of our

1 information into this response. We had gone
2 through --

3 **MR. GRIFFON:** Because I know we had asked
4 about thorium workers, quote/unquote, thorium
5 workers, but that comes up later, right?

6 **MR. ROLFES:** Then there was also some
7 question about who was potentially exposed to
8 enriched uranium. So I provided both listings
9 as an indicator of thorium exposures as well
10 as potential enriched uranium workers based on
11 in vivo data.

12 **MR. GRIFFON:** But they're not the same list,
13 and they don't necessarily overlap or anything
14 like that.

15 **MR. ROLFES:** There are some people that are
16 both.

17 **MR. GRIFFON:** And the list of U-235 in vivo
18 count results of at least 100 micrograms more
19 than one time's provided. Was this list -- I
20 haven't looked at it, but was this list
21 constructed by NIOSH or --

22 **MR. ROLFES:** Yes.

23 **MR. GRIFFON:** -- was this something that was
24 -- so you pulled this out of in vivo --

25 **MR. ROLFES:** Exactly. Let me qualify this a

1 a 100 microgram quantity because that's a
2 readily detectable quantity to identify a
3 person that could have had a potential
4 enriched uranium exposure. So that's why
5 we're providing it.

6 **MR. GRIFFON:** And that was derived from HIS-
7 20 or how was that --

8 **MR. ROLFES:** No, this was actually from the
9 raw data sheets that NIOSH collected, the
10 mobile in vivo data which are available on the
11 O drive. We just went through by hand and
12 looked for the results that exceeded 100
13 micrograms.

14 **MR. GRIFFON:** So back to my original
15 question. I'm a little slow on the uptake on
16 this, but I saw a thorium worker -- this goes
17 back to this document you provided, there was
18 a PDF called thorium worker I think, maybe I'm
19 wrong. Is that true?

20 **MR. ROLFES:** I can take a look through my
21 notes here, and I believe there was a list of
22 thorium workers, a list of potential enriched
23 uranium workers, and then an Excel spreadsheet
24 that had both listed just by the names of the
25 employees. And the PDFs actually included all

1 of the employees' in vivo data for both the
2 potential enriched uranium exposures as well
3 as the thorium. So anyway I do have a copy.
4 I have the stack of mobile in vivo results for
5 each of the categories I've just described so
6 if you'd be interested in making a copy or
7 something.

8 **MR. GRIFFON:** Okay. I mean, I probably have
9 it, but I see lists of thorium and former
10 thorium workers, but I don't see the uranium
11 one.

12 **MR. ROLFES:** Thorium and former thorium
13 workers at Fernald and then list of potential
14 enriched uranium workers.

15 **MR. GRIFFON:** I can sort this out.

16 **MR. CLAWSON:** We have a comment over here
17 from that --

18 **MS. BALDRIDGE:** Is that list including
19 workers pre-1966?

20 **MR. ROLFES:** Well, enriched uranium --

21 **MS. BALDRIDGE:** No, reference to the
22 thorium.

23 **MR. ROLFES:** Reference to the thorium, it
24 certainly is, yes. I'm not saying it's 100
25 percent complete because in the early time

1 period, mobile in vivo results were not
2 available. And what was done, there were
3 individuals at the site who had investigated
4 former people that were working on the thorium
5 projects and compiled a list of individuals
6 who were involved.

7 However, based on the information that
8 we're using for dose reconstruction, we're
9 going to be using air monitoring data for
10 those early time periods when people did not
11 have in vivo counts, so --

12 **MS. BALDRIDGE:** And how are you doing that
13 for plant six when they didn't even know it
14 was there? Have you found air monitoring
15 measurements? I mean, they weren't available
16 for the original site profile so did you find
17 those?

18 **MR. ROLFES:** We certainly did, yes. That's
19 a very good important point because NIOSH was
20 not aware of those initially, and Fernald
21 certainly was. Fernald documented the, they
22 actually had prepared to, basically after the
23 materials in plant nine in the early 1954,
24 '55, '56 time period were produced, a lot of
25 the materials that were left over were put

1 into a storage building. They wanted to
2 reduce the volume of those materials and
3 convert them to a safer storage method.

4 So they converted a furnace in plant
5 six in the, in late 1959, they converted the
6 plant six furnace to essentially roast and
7 oxidize the thorium materials into a safer
8 storage form. And that was done between, I
9 believe, '60, '61 time period. I'd have to
10 take a look at the exact notes that we do have
11 and documents. But it certainly was
12 documented; however, NIOSH did not initially
13 have that documentation so in the early time
14 period.

15 **MS. BALDRIDGE:** Another question, have you
16 checked the workers' records based on the
17 exposures that were presented in the documents
18 to see that your records agree with the
19 National ^ of Ohio records that were provided
20 in exposure?

21 **MR. ROLFES:** Yes, we have begun a comparison
22 of urinalysis cards to information that we
23 received from the Department of Energy and our
24 dosimetry response file which is out of HIS-
25 20. So we've been asked by the Advisory Board

1 members to compare the data that's in the HIS-
2 20 database to information on urinalysis
3 cards. And so we are in process. We've
4 completed the analysis of -- I don't want to
5 give a number. I don't have the number off
6 the top of my head. Gene Potter, I believe,
7 is on the line. If he would care to address
8 some of the data comparisons, that would be
9 helpful for us.

10 Gene, are you available?

11 **MR. POTTER:** Yes, let me get my mute button
12 there. What we've looked at so far was large
13 blocks of data that were available in the
14 SRDB. And these are mostly plutonium results
15 from the '80s, and those results are comparing
16 very favorably. And we'll have all that in
17 some sort of final report.

18 Still waiting to get more information
19 from DOE. There are some smaller sets of data
20 particularly for a given worker that are in
21 the SRDB that can be compared also. But we're
22 looking to hopefully do some statistical
23 comparisons from, say like a goodly number
24 from each decade to compare to the data in
25 HIS-20.

1 **MR. ROLFES:** Thank you, Gene.

2 Is there anything else, Ms. Baldrige?

3 **MS. BALDRIDGE:** That's fine, thank you.

4 **MR. GRIFFON:** So on number four I do find a
5 spreadsheet called "Fernald In Vivo Review",
6 9/25/07. And this says former thorium
7 workers. The PDF file actually it says list
8 of former thorium workers, but it's actually
9 31 pages of there are in vivo counts for 31
10 people or about 30, whatever it is, 29 people.
11 And then in the next column, in Column B of
12 this Excel spreadsheet, you say potential
13 enriched uranium workers. And those in this
14 list have about 74, and you're saying these
15 are the people that were greater than 100
16 micrograms at any one time?

17 **MR. ROLFES:** Yes.

18 **MR. GRIFFON:** So they're not necessarily all
19 potential enriched uranium workers for those
20 with a significant reading anyway.

21 **MR. ROLFES:** Sure, sure, these are the
22 individuals who would have had high ^
23 exposures.

24 **MR. GRIFFON:** I don't know that there's any
25 further follow up on that.

1 Arjun, do you have something?

2 **DR. MAKHIJANI:** I'm a little confused. Are
3 we on five?

4 **MR. GRIFFON:** I'm on number four actually.
5 I was just trying to clarify what documents
6 existed to support that it wasn't --

7 **DR. MAKHIJANI:** Four is still about
8 enrichment, right?

9 **MR. GRIFFON:** Yeah. NIOSH's response number
10 four to the first Finding.

11 **DR. MAKHIJANI:** Oh, response number four to
12 the first finding.

13 **MR. GRIFFON:** First finding, yeah, yeah,
14 yeah.

15 **DR. MAKHIJANI:** I'm in the fourth finding.

16 **MR. GRIFFON:** All right, and there's a
17 response, part of that response, it talks
18 about thorium again. I think we cover that in
19 another finding, but air monitoring data for
20 thorium tasks, '66-'72 being made available by
21 another division of NIOSH. It's now being
22 entered in a spreadsheet. So you have a
23 follow up on that is to provide that
24 spreadsheet? That hasn't been provided yet,
25 right?

1 **MR. ROLFES:** Entered into spreadsheet, let's
2 see. Air monitoring data for thorium.

3 **MR. GRIFFON:** This really talks about
4 thorium. I get a little confused.

5 **MR. ROLFES:** We have provided the air
6 monitoring data for thorium. It is available
7 to the Advisory Board on the O drive.

8 **MR. GRIFFON:** So I'll work with you later,
9 Mark, but we've got to cross-reference that on
10 another action because this is kind of in the
11 wrong place, I think, right?

12 **DR. MAKHIJANI:** I have a question about that
13 spreadsheet, if I might.

14 **MR. GRIFFON:** Yes.

15 **DR. MAKHIJANI:** There are two or three
16 spreadsheets actually. I've downloaded them
17 all and there's one spreadsheet that says
18 "Fernald Thorium Data Air Samples Combined".
19 But only a few of these samples are actually
20 labeled thorium. It seems like a lot of these
21 are just uranium samples.

22 **MR. GRIFFON:** Can we come back to that when
23 we get to the thorium action? I'm with you,
24 Arjun, but I want to get through the ^. I
25 think we're almost there because number five -

1 - I'm just going through these one by one to
2 make sure we're thorough here.

3 Total production numbers and the
4 differences. You say you're still in progress
5 on that, Mark. Is that correct?

6 **MR. ROLFES:** Yes, the comparison of HIS-20
7 data, is that what we're --

8 **MR. GRIFFON:** No, it's number --

9 **DR. ZIEMER:** It's the fifth action.

10 **MR. ROLFES:** I apologize. We are certainly
11 reviewing the total production numbers;
12 however, these are not something that is going
13 to directly impact dose reconstruction.

14 **MR. GRIFFON:** Right, and I would, I guess my
15 druthers would be to do the best we can on
16 that, but also understand that we don't need ^
17 because it's probably not going to impact on
18 dose reconstruction.

19 **MR. ROLFES:** Right, I agree with that.

20 **DR. MAKHIJANI:** But production is really
21 important only for two things that I can think
22 of. Because one is when did these things
23 start? When did RU start? When did enriched
24 uranium? What were the levels of enrichment?
25 I agree that we don't need --

1 **MR. GRIFFON:** Any precision here.

2 **DR. MAKHIJANI:** -- precision in the actual
3 production numbers. We need precision in the
4 other things, you know, content of RU ^ dose
5 related.

6 **MR. GRIFFON:** So we just want to keep that
7 in mind.

8 **MR. CLAWSON:** If I might, something else
9 from the outside people looking in. You can
10 go on the DOE site, and it shows this much,
11 and you go to these actual TBD and you're
12 talking --

13 **MR. GRIFFON:** Absolutely, we have to at
14 least be responsive to that.

15 **MR. CLAWSON:** Just so that people can see
16 why there is such a broad difference there.
17 That's one of the things.

18 **MR. ROLFES:** That's very important, and we
19 do occasionally get calls like that, and
20 usually we're able to resolve those calls, you
21 know, when we speak to the claimants. So we
22 do get questions like that that we're able to
23 resolve.

24 **MR. GRIFFON:** Okay, for number six you have
25 see number four. But I don't know that that

1 sample one, you say the person's not a
2 claimant, right?

3 **MR. ROLFES:** Correct.

4 **MR. GRIFFON:** Did you find any claimants
5 that fit this category or were there --

6 **MR. ROLFES:** Yes.

7 **MR. GRIFFON:** And so I don't think you've
8 answered that question. Can you provide claim
9 numbers?

10 **MR. ROLFES:** Well, we've provided a list of
11 names so that was --

12 **MR. GRIFFON:** They're in that list then.
13 Okay, so they're back in that spreadsheet.

14 And number seven, and, Hans, I think
15 you have a follow-up report on this, did you
16 not?

17 **DR. BEHLING:** Yes, I think it was e-mailed
18 to all of the working group people, and I have
19 some hard copies here as well.

20 **MR. GRIFFON:** Do you have any comments on
21 this one?

22 **DR. BEHLING:** Well, I'm not sure we're ready
23 to discuss it, but the petitioner, Ms.
24 Baldridge, had identified an issue at one of
25 the full Board meetings and at the most recent

1 working group meetings that relates to the
2 issue that -- and I'll summarize it, what
3 happens when you have a person who has had a
4 significant exposure to uranium that
5 potentially renders the kidney less than 100
6 percent functional, and what does that do to
7 invalidate subsequent bioassay data?

8 In other words for people who had been
9 exposed either chronically to high levels or
10 perhaps as a result of a single incident that
11 renders the kidney less than functional in a
12 normal sense, to what extent will that
13 exposure invalidate the bioassay data that you
14 would essentially look at following such an
15 incident, or on a chronic level and
16 essentially render that data invalid?

17 And as a result of that question, I
18 looked into it, and there's very little data
19 out there. I had to look at one of the major
20 documents, and that is the "Toxicological
21 Profile for Uranium". I brought with me only
22 the draft form that was issued in 1998, and I
23 do want to pass that on to Sandra, but I've
24 also got the most recent version, final draft,
25 which was issued in 1999.

1 And I reviewed the data which is
2 segregated on the basis of exposure pathways
3 that separates out from inhalation, ingestion,
4 wounds, et cetera, and different types of
5 compounds based on solubility. And you will
6 see, when you go through that document,
7 there's an incredible wealth of information,
8 but unfortunately, always it involves animals,
9 different species, from rats, mice, rabbits,
10 dogs, goats, et cetera, et cetera.

11 There was all but one case study that
12 involved a human. And I don't say that that
13 was the only human study, but it was the only
14 human study where it was clinically determined
15 that the person suffered from toxic effects of
16 uranium and reduced kidney function. And that
17 is a 1990 article by Zhao and Zhao and
18 involved an individual who was exposed to
19 significant quantities in two incidents to
20 uranium tetrachloride.

21 It was clearly shown that he had
22 impaired renal function, and it was also shown
23 that the excretion data for that individual as
24 a function of time followed a track that could
25 not be explained by the conventional ICRP

1 model. And in short, if you look at the
2 document, you will see that this individual
3 was monitored for the first 64 days following
4 this incident.

5 And you'll see a steady increase in
6 24-hour urine excretion for that individual
7 rose from about 152 micrograms per liter to
8 over 3,000, and then thereafter it declined
9 exponentially by two functions. What it
10 triggered in my mind is let's assume this
11 individual had been monitored up front, and
12 the excretion was very modest at first.

13 That would suggest, well, there's no
14 reason to even follow this guy up because
15 based on the early excretion data of one
16 hundred and some odd micrograms per 24 hour
17 urine excretion, there's no need to concern
18 only to realize that subsequent time when he
19 may not be monitored anymore that his
20 excretion had risen twenty-fold to over 3,000
21 micrograms. And it does, in fact, support the
22 potential concept that when you have toxic
23 levels of intake for uranium, that the
24 bioassay data may reflect numbers that do not
25 coincide with our expectation based on ICRP

1 excretion models.

2 And I do want to ask the Board now if
3 I can make a copy of that report available to
4 Ms. Baldrige? Because it has not gone
5 through the review cycle of the Privacy Act,
6 but on the other hand, she was the petitioner,
7 and it's mostly her documents that were
8 reviewed in context with this issue. So I
9 will ask the Board at this time if I can offer
10 or send her a copy of the report.

11 **DR. ZIEMER:** I don't think the Board can
12 make that determination. It's a legal
13 question.

14 **MR. CLAWSON:** This is the report that you're
15 talking about, Hans?

16 **DR. BEHLING:** Yes.

17 **MR. CLAWSON:** The one you gave us? I'll get
18 Mr. Wade to take a look at it.

19 **MS. BALDRIDGE:** Hans, I can wait until it's
20 cleared. There's no urgency.

21 **MR. GRIFFON:** Yeah, I think we might have to
22 wait --

23 **DR. BEHLING:** There's nothing in there that
24 she hasn't seen before, obviously.

25 **MR. CLAWSON:** We'll give this to Mr. Wade,

1 and he'll get with legal counsel and make sure
2 we vet it, and then we'll get you a copy of --

3 **MS. BALDRIDGE:** And that leads to the next
4 question concerning the [identifying
5 information redacted]. When we went through
6 the interview process on [identifying
7 information redacted] claim, I was asked
8 questions and asked if I had any additional
9 information. And I was making references to
10 [identifying information redacted] records.
11 And the interviewer said where are you getting
12 this? I said, well, I'm assuming it's in his
13 records. The records that were used for
14 [identifying information redacted] dose
15 reconstruction did not have any of the
16 information concerning him having [identifying
17 information redacted] which were contained in
18 the National Lab of Ohio infirmary records
19 when he was diagnosed by the doctors there,
20 and evidently monitored to some degree for
21 that damage. Now, I question, I had asked
22 Mark, what records does NIOSH have from
23 National Lab of Ohio because those records
24 were turned over by the court to the employees
25 and put in trust. So I don't know if in the

1 '90s a copy of that information was provided
2 or not provided, but I know in [identifying
3 information redacted] case those records were
4 provided by me for his claim and that NIOSH
5 did not have access to them. Or if they were
6 in the databank, they haven't been located.

7 **MR. ELLIOTT:** You did provide them by claim?
8 With your claim you provided them.

9 **MS. BALDRIDGE:** I provided them with the
10 claim, but since the petition records that the
11 class of workers which could be potentially
12 600 people apart from the 900 or so who have
13 applied for claims, their records would not
14 have been provided that would indicate whether
15 or not they had issued the [identifying
16 information redacted].

17 **DR. ZIEMER:** From what you describe, Hans,
18 it sounds as if the [identifying information
19 redacted] increases the uranium turnover in
20 the urine. And if I'm a dose reconstructor, I
21 think I'm going to be estimating more uranium
22 in the body than I would otherwise.

23 **MS. BALDRIDGE:** Actually, it causes a
24 retention of salts.

25 **DR. BEHLING:** Yeah, it does not --

1 **DR. ZIEMER:** Well, you're talking about a
2 fraction of the body burden being excreted --

3 **DR. BEHLING:** If you look at, for instance,
4 the assessment of the initial intake for this
5 individual who is the case study, and then you
6 look at the ICRP excretion fraction which is
7 now a number, you would expect \hat{W} which was
8 cited in this case to be about three percent
9 or four percent on day one.

10 **DR. ZIEMER:** Right.

11 **DR. BEHLING:** And obviously, that was not
12 the case. The 156 micrograms was a small
13 fraction, less than one percent; and
14 therefore, it is clearly not in concert with
15 what you would expect to based on the relative
16 quantity that would be expected to be excreted
17 if you looked at the ICRP model as a reference
18 value.

19 **DR. ZIEMER:** But you wouldn't only use day
20 one.

21 **MR. ROLFES:** Exactly, exactly. That's a
22 very important point because right here we've
23 indicated that NIOSH would significantly
24 underestimate an intake or a body burden if
25 such an assay were to be performed in the

1 first few days following an acute exposure.
2 That's a very important point because we would
3 not rely only on a limited set of data. We
4 would consider the total uranium excreted from
5 the incident all the way out until the end of,
6 until the urine sample dropped back down to
7 below detectable levels. So we cannot --

8 **MS. BALDRIDGE:** The point is [identifying
9 information redacted] is not something that
10 just occurs for a few days while they might be
11 excreting uranium levels from an incident. It
12 causes an inflammation which affects the
13 [identifying information redacted] ability to
14 process and excrete the salts, particularly
15 uranium hexafluoride or tetrachloride to the
16 point that, as I've read, begins to excrete
17 and causes it to be withdrawn and deposited in
18 the [identifying information redacted] which,
19 in fact, is not allowing the uranium to leave
20 the body, leave the [identifying information
21 redacted], but is actually extracting that
22 portion from the water portion of the urine
23 and depositing the salts, the uranium salts,
24 in the [identifying information redacted].

25 **DR. BEHLING:** And let me make a comment

1 here.

2 **MS. BALDRIDGE:** The long-term excretion
3 ability for the [identifying information
4 redacted] in people with [identifying
5 information redacted].

6 **DR. BEHLING:** The data suggest that there is
7 obviously a reduced excretion early on that
8 perhaps reaches a high point, in this case if
9 one can look at this case and assume it may
10 represent other individuals, you reach the
11 maximum excretion value around 62 days after
12 the exposure. But what it means is that if
13 you took the day after or a couple days after
14 where you're at the low end, you would clearly
15 not assess this person's exposure accurately.
16 You would underestimate clearly.

17 **DR. ZIEMER:** I think Sandra is saying that
18 the integrated excretion will still be low
19 regardless --

20 **MS. BALDRIDGE:** Right.

21 **DR. BEHLING:** It probably would be.

22 **DR. ZIEMER:** -- of what the ^. It seems
23 like if there's a retention here which, if
24 that's the case, the integrated will give you
25 a different answer.

1 **DR. BEHLING:** If you had chronic
2 [identifying information redacted] failure or
3 a chronic reduced [identifying information
4 redacted] function, and I've looked at some of
5 the animal studies where basically the
6 [identifying information redacted] seizes and
7 stops. It shuts down, and you'll have to, if
8 you're a human, you have to resort to
9 dialysis.

10 **MR. ROLFES:** Correct. It's a very, very
11 serious condition where the [identifying
12 information redacted] do stop. You stop
13 producing urine. You do not excrete urine or
14 uranium.

15 **DR. BEHLING:** I know that, but the truth is
16 you can have partial [identifying information
17 redacted] that doesn't block the entire
18 [identifying information redacted] function
19 but is reduced [identifying information
20 redacted] function. And under chronic
21 exposure conditions where there's a chronic
22 reduction in [identifying information
23 redacted] function, not 100 percent to the
24 point where a person stops secreting, you're
25 altogether at a catastrophic end point.

1 But in the sense where you have
2 partial reduction in urine excretion of
3 certain metal salts, you would falsely assume
4 that the exposure was less than what it truly
5 is. This is what these data dictate to me.

6 **MR. ROLFES:** I don't see this as
7 invalidating the data that we do have. This
8 is a single data point, a single case
9 scenario. And it's a big leap of faith to use
10 one case scenario to apply, you know, in an
11 acute, very serious exposure condition like
12 this which required medical intervention, it's
13 a very big leap of faith to try to apply that
14 to a chronic routine exposure at a much, much
15 lower level.

16 **MS. BALDRIDGE:** Mark, one of the documents
17 that was submitted with the petition where 17
18 men had exposure and 100 percent of them had -
19 -

20 **DR. BEHLING:** It's part of the exhibits in
21 this report as you will see. I included that.

22 **MR. ROLFES:** Yeah, that is very true. There
23 was an incident with uranium hexafluoride for
24 17 individuals who received it. There were
25 some immediate concerns about the individuals'

1 health because this is an unusual occurrence
2 and a significant incident. When you have an
3 exposure to this material, to UF-6, it's
4 highly soluble.

5 **MS. BALDRIDGE:** I don't think you can claim
6 that it only occurred in individuals who were
7 involved in an incident like the one
8 documented. It shows a pattern that uranium
9 hexafluoride causes damage, period. Now if
10 you can identify everyone who was exposed to
11 uranium hexafluoride, you will know which ones
12 to begin checking for that.

13 **MR. ROLFES:** Sure, sure, uh-huh.

14 **MS. BALDRIDGE:** I mean, to say it was
15 limited to an isolated incident or an isolated
16 claim or case I think is a little narrowing.

17 **MR. ROLFES:** No, certainly these are
18 significant events. The individuals that were
19 involved in this UF-6 release required medical
20 intervention, and they were well monitored.
21 In taking a look at -- I actually do have a
22 list of individuals that were directly
23 involved in the 1966 UF-6 release at Fernald,
24 and these individuals gave immediate urine
25 samples. Let me get to the results here.

1 There are 12 AEC employees listed on
2 this sheet, and between these 12, there are 35
3 urine samples taken. The one individual --
4 one, two, three, four, five, six, seven,
5 eight, nine, ten, eleven, there are 11 urine
6 samples for the one individual. It appears
7 that five of which are in the first 24 hours.
8 So these are acute scenarios that are unusual
9 occurrences.

10 Fernald routinely --

11 **MR. GRIFFON:** Mark, do we have that
12 document?

13 **MR. ROLFES:** Yes, I do believe this has been
14 made available to the Advisory Board as well.
15 Let me take a look at my list here for a
16 second.

17 **MS. BALDRIDGE:** I think the unusual
18 occurrence may be that they were monitored or
19 detected and not the fact that the exposure
20 was a unique occurrence.

21 **MR. ROLFES:** I'm sorry. Could you repeat
22 that, please?

23 **MS. BALDRIDGE:** I think the unique
24 occurrence would have been that they were,
25 that the exposure incident was reported and

1 these people were monitored and not that the
2 occurrence of [identifying information
3 redacted] was the unique occurrence. I'm sure
4 during the course of the operation at Fernald
5 more than 17 people were exposed to uranium
6 hexafluoride.

7 **MR. ROLFES:** Oh, yeah, I'm not by in any way
8 limiting this to only these individuals that
9 are listed on this particular incident report.
10 However, Fernald did do additional research
11 and development with individuals who had been
12 exposed to uranium. We have indications --
13 well, let me start off with on an annual
14 basis, personnel provided urine samples.

15 In addition to urinalyses that were
16 looking for uranium concentrations in urine,
17 individuals on an annual routine basis
18 provided urine samples that were analyzed for
19 things that would determine whether
20 [identifying information redacted] function
21 was, in fact, being impaired or not. This, in
22 fact, was the reason, Fernald was concerned
23 about chemical toxicity, and so they monitored
24 employees for any chemical toxicity effects.

25 If you take a look at the information

1 that was collected from a urine sample during
2 an annual physical, there were indicators to
3 determine whether there was albumin being
4 excreted in the urine. They were looking for
5 proteins in the urine as well. They were
6 looking for a condition known as proteinuria
7 which would be an indicator of [identifying
8 information redacted]. They were also looking
9 for blood in the urine. They were looking for
10 white blood cells in the urine. They were
11 looking for various types of castes that are
12 formed by cells in the [identifying
13 information redacted].

14 These are all indicators of, in
15 addition, they would look at the specific
16 gravity and the color of the urine as well.
17 You can infer a lot of things as a medical
18 doctor from information collected. I am not
19 aware of any indicators where an individual
20 has a documented case of chronic [identifying
21 information redacted] failure based on routine
22 exposures at the site.

23 **MS. BALDRIDGE:** Next question goes back to
24 do you have the records that show what the
25 albumin was, what the proteins were that would

1 have all have been included in their infirmary
2 records? If you do not have those records,
3 then you have to rely on the documentation
4 that was provided either in the petition
5 stating that 17 people had damage or the
6 documentation that was sent with the claimant
7 showing what their excretion rates were.

8 **MR. ROLFES:** We know based on the list of
9 individuals that were provided in the petition
10 that had [identifying information redacted].
11 These individuals had acute [identifying
12 information redacted]. This is significantly
13 different and caused by a large exposure to a
14 highly soluble uranium hexafluoride gas.

15 **MS. BALDRIDGE:** [identifying information
16 redacted] is not one of those individuals.
17 His damage was discovered during a routine
18 urinalysis. There was no record that he has
19 ever had an exposure other than the notation,
20 it's apparent that this man has been exposed
21 because of what we're seeing in his urinalysis
22 records.

23 **MR. ROLFES:** In a specific case like this
24 what we would need to do is take a look at the
25 urinalysis data. That would be the first

1 place to start. As a medical doctor could
2 take a look, excuse me, at the medical
3 records. A medical doctor would be able to
4 infer information regarding the [identifying
5 information redacted] function from these
6 urinalyses results that you're referring to.
7 The problem with chronic [identifying
8 information redacted] failure, not just
9 uranium can cause [identifying information
10 redacted]. Several other environmental
11 factors, health factors such as diabetes, high
12 blood pressure, can all contribute to chronic
13 [identifying information redacted] failure.
14 So we would have to make a case-by-case
15 analysis.

16 **MS. BALDRIDGE:** Does NIOSH have the
17 information?

18 **MR. ROLFES:** What information?

19 **MR. GRIFFON:** Do you have the medical
20 records?

21 **MS. BALDRIDGE:** To determine whether --

22 **DR. ZIEMER:** To determine if there's a
23 [identifying information redacted] problem for
24 a given individual.

25 **MS. BALDRIDGE:** -- there could be a

1 [identifying information redacted] problem
2 which would affect the validity of the
3 urinalysis records for anyone in the class?

4 **MR. ROLFES:** Once again, we do not have a
5 comprehensive, I don't want to mislead anyone.
6 We do not have a comprehensive documentation
7 of everyone's medical records on the site. We
8 do, however, have everyone's urinalysis data,
9 and that would be the first place to start.
10 If we observe something that was unusual with
11 those urinalysis data, then it would trigger
12 additional investigation into that claim.

13 **MS. BALDRIDGE:** That urinalysis data, is
14 that uranium urinalysis or complete
15 urinalysis?

16 **MR. ROLFES:** We would certainly know if
17 there was something unusual because of the
18 amount of data that is provided. We would
19 take a look at the urinalysis data first. We
20 would take a look at in vivo data, if the
21 person was not excreting the uranium that
22 would be residing within the body, it would
23 readily detectible by the in vivo results.

24 **DR. BEHLING:** Well, that came after '68. I
25 mean, there are a lot of loopholes here.

1 Let's face the fact that if you have chronic
2 [identifying information redacted], the
3 urinalysis will not allow you to make that
4 decision as to whether or not there's
5 something unusual. You'll just see a reduced
6 urine content of uranium. That's all you're
7 going to see. You're not going to be able to
8 say whether that reduced uranium excretion
9 value is legitimate or is the result of
10 reduced [identifying information redacted]
11 failure, and that's the bottom line.

12 **MR. ROLFES:** Okay.

13 I'd like to point the Advisory Board
14 members to some research that was, in fact,
15 done by the Fernald site on this topic. There
16 were, in fact, case studies of human exposures
17 to uranium for individuals that were in fact
18 employed at... There were four individuals
19 that were directly exposed to uranium at
20 Fernald. These individuals during their time
21 period at Fernald did pass away from various
22 causes.

23 The Atomic Energy Commission was
24 interested in learning additional pieces of
25 information from individuals that had worked

1 at the site in order to determine whether
2 this, in fact, was a concern. I'd like to
3 point back to the conclusions that resulted
4 from the autopsy data.

5 There were organ-specific examinations
6 of uranium content as well as a detailed
7 investigation of the kidney tissues. The
8 amount of uranium found in analyses of the
9 kidneys is well below the level at which we
10 would expect to find kidney damage. The
11 microscopic sections indicate no kidney damage
12 which could be attributed to uranium. It
13 appears to us that the kidney may be the
14 critical organ for these types of exposures we
15 encountered.

16 So it shows to me that they certainly
17 were concerned about this, and it was
18 investigated. We have no indicators other
19 than a single case study that would invalidate
20 our dose reconstruction model.

21 **DR. BEHLING:** I'm having somebody from the
22 ICRP who's one of our consultants actually
23 look at that data and try to make heads or
24 tails with it because quite honestly it did
25 strike me odd to look at that excretion value

1 for that individual and realize it was going
2 up for probably 64 days and then precipitously
3 dropped thereafter.

4 And I'm having them look at it so to
5 say is there an explanation that is reasonable
6 and should be looked at in more detail in how
7 it might apply to other claimants here at
8 Fernald.

9 **MR. ROLFES:** This individual did have acute
10 renal failure so he stopped producing urine.
11 I believe it's documented in this report, but
12 he was only producing about ten milliliters of
13 urine in a day versus the normal excretion
14 amount of roughly 1.5 liters.

15 It's very possible this individual had
16 to receive medical intervention because of his
17 huge exposure. It's very possible this
18 individual was given something such as like a
19 bicarbonate to expedite, sort of like a
20 chelating agent, to expedite the excretion of
21 uranium that remained within his body.

22 I don't know if that was the specific,
23 I don't know if the treatment regimen, and I'm
24 not a medical doctor so I'm not qualified to
25 evaluate his medical history and the treatment

1 of this case. But I would have to take a look
2 or have a medical doctor take a look at that
3 information to make a judgment about this
4 specific case. And once again, this is one
5 single case where there was a large ^
6 exposures.

7 **DR. BEHLING:** And I have stated up front
8 that human data are very few. And I looked at
9 other data that were, in fact, also published
10 in 1990, an article by Ron Fischer and Ron
11 Kathrin and others and also involving
12 tetrachloride, and unfortunately in those
13 instances the clinical data doesn't support
14 renal damage. The clearance rate was given
15 there and so forth, but I was focusing on
16 strictly dose human data where there was
17 excretion values associated with clinically
18 diagnosed renal failure. And that's the only
19 case that I was able to find.

20 **MR. SHARFI:** Were those reported in 24
21 hours?

22 **DR. BEHLING:** Yes, yes, actually, they were
23 adjusted because I believe they didn't always
24 collect, and then they arbitrarily said let's
25 multiply everything so that the 24-hour urine

1 volume ends up being at 1.4 liters.

2 **MR. ROLFES:** And that's a good point but --

3 **MR. SHARFI:** Because ^ concentration. I'm
4 not sure, I wonder if the concentration
5 changes because of the renal damage versus the
6 total uranium output.

7 **DR. BEHLING:** I can tell you just looking at
8 the numbers because for the first 24 hours
9 they cite as the 21st hour urine volume as 104,
10 I think, micrograms per liter. And then if
11 you look at the actual figure itself, it looks
12 to be that if that was scaled up to 1.4 liters
13 at 152 micrograms. So I believe that all of
14 the data points you see are, in fact,
15 normalized to a 24 hour urine excretion
16 volume.

17 **DR. ZIEMER:** Mark, could you clarify on some
18 of the other markers like albumin and so on?
19 Was that routinely done in connection with
20 your uranium analysis or only on cases where,
21 such as the one you cited, where there was a
22 known high intake?

23 **MR. ROLFES:** The annual physicals at Fernald
24 collected urine samples separate from the
25 regular uranium urinalyses to evaluate the

1 individual's health.

2 **DR. ZIEMER:** And then I think the question
3 was do we have that as something that can be
4 coupled with the uranium data so that if there
5 are such indicators -- let's just take a
6 hypothetical case. Here's Worker X who has
7 elevated albumin, say, indicating something
8 with the kidney. What do we do with that
9 relative to the model?

10 **DR. WADE:** First, do you know? And then
11 secondly, what do you do with it?

12 **DR. ZIEMER:** Or do we even know of that?
13 That's what I'm asking you. Sort of, or is
14 that data separate. Sandra suggested it may
15 be somewhere else and is not available.

16 **MR. GRIFFON:** That's the first question,
17 you're right. But hypothetically, even if you
18 did have it in the --

19 **DR. ZIEMER:** Well, do we have it?

20 **MR. GRIFFON:** I don't think you do have
21 those references in the DR file, right?

22 **MR. ROLFES:** No, we do not receive the
23 complete medical history; however, we do
24 receive, for example, medical X-rays, et
25 cetera, out of those medical files.

1 **DR. ZIEMER:** And you do have it for special
2 cases where we know there's an extreme --

3 **MR. GRIFFON:** But then the question would be
4 if you were to get it all from DOE, assuming
5 you could, what would you do with it relative
6 to the model is your second question.

7 **DR. ZIEMER:** Well, I'm not sure what we can
8 do with it. Because you could raise the same
9 question about any individual and their
10 general health and say what do you do, you
11 know, is there a separate model for a
12 diabetic? Is there a separate model for you
13 name it? The only time we correct for a sort
14 of a lifestyle issue is for smoking. The
15 uranium case is somewhat unique in that the
16 agent itself that we're interested in has the
17 dual function of toxicity and ^ . It's not
18 really dual. All the limits on the uranium
19 are based on the chemical toxicity which in a
20 sense if you've exceeded that -- well, you
21 don't worry about the radiological because the
22 chemical shows up sooner in a sense as far as
23 dose limits are concerned. But in any event,
24 I'm wondering how we --

25 **MR. RICH:** Up to about two and a half

1 percent.

2 **DR. WADE:** So those are the questions I
3 think NIOSH has to think about. Do you know?
4 If you don't know, can you find out? And then
5 if you do have the information --

6 **DR. ZIEMER:** Well, even if you had it, what
7 would you do with it? I think in an
8 individual case, if we know there's definitely
9 a medical diagnosis of renal damage, it seems
10 to me you could maybe say, okay, what will we
11 do in this case and consider that. If you
12 just have indicators like the albumin level is
13 a little bit up or nowadays if the PSA value
14 is up on somebody what do you do with that or
15 whatever it is.

16 **MR. ROLFES:** Another point that I think is
17 worth mentioning that NIOSH selects the
18 solubility type of the uranium to which the
19 person is exposed based upon the urine data
20 that is provided to us. So if we have
21 indication that the uranium that the person
22 was exposed to is not being excreted as
23 rapidly as is expected, that would be
24 indicative to us that the material is less
25 soluble.

1 **DR. BEHLING:** How do you, you're making
2 statements that you can't verify. How can you
3 say when, if I go in and report to a location
4 where I submit my 24-hour urine sample Monday
5 morning, and it shows so many milligrams per
6 liter of 24-hour volume, how do we know
7 whether that's to be expected?

8 I mean, you can't tell me that you can
9 look at the urine data and say, oh, this is
10 abnormal. There must be something wrong.
11 Let's do a kidney function test. That just
12 doesn't sound right.

13 **MR. ROLFES:** Well, a urinalysis of a couple
14 milligrams per liter would certainly be --

15 **DR. BEHLING:** It's just the opposite.
16 You're likely to see less than what you would
17 expect.

18 **MR. ROLFES:** If we saw less, then what we
19 would expect, that would be indicative of a
20 less soluble material which resides in the
21 body.

22 **DR. BEHLING:** You're missing the point here.
23 You don't know --

24 **DR. ZIEMER:** You just have a number.

25 **DR. BEHLING:** -- you don't know what to

1 expect.

2 **DR. WADE:** Sure, I think an issue has been
3 identified at least to be looked at and it
4 needs to be commented on.

5 **MR. ROLFES:** Once again, we cannot just
6 consider single pieces of information. For a
7 specific case if you can provide a specific
8 case scenario, we would have to take a look at
9 that specific case, use the urinalysis data,
10 compare the in vivo data, look at medical
11 histories. You know, it would be a very
12 comprehensive study that would need to be
13 done.

14 **DR. ZIEMER:** I would think a pretty serious
15 renal damage, you would see some drastic
16 changes in the volume of the urine which might
17 be an indicator aside from the albumin issue.
18 If somebody's excreting a few milliliters a
19 day, it's indicating the system is shutting
20 down. Then you might, the dose reconstructor
21 might be looking at that, and I don't know
22 what they would do with it.

23 **MR. CLAWSON:** Yeah, but the thing is when
24 you go give one of these urine samples, you
25 give a urine sample for your medical to check

1 for ^ . Every so often they give you a urine
2 check for uranium. We always got a line.
3 We've got to fill to there. If it takes one
4 day or two days that's what you get. And see,
5 this is where the big question is coming in
6 at.

7 **DR. BEHLING:** But the classical case is
8 Sandra's [identifying information redacted].
9 He was not a person who was suspect to be
10 exposed to uranium, but on a routine medical
11 examination, perhaps an annual, he was
12 diagnosed to have the issue of [identifying
13 information redacted] failure. And there was
14 no relationship to urinalyses that were done
15 on an employee uranium excretion.

16 So what do you do if on your annual
17 routine medical exam, you end up with a
18 clinical data that says you may have been
19 exposed to levels of uranium that rendered
20 your [identifying information redacted] less
21 than perfect? And now you go back and may not
22 even have any urine data to look at to assess
23 what exposures. And even if you did, what
24 does that tell you? What does that data tell
25 you? Is it legitimate or isn't it legitimate?

1 **MR. ROLFES:** That's an important point. One
2 thing that an individual with chronic
3 [identifying information redacted] disease, if
4 untreated, can lead to end stage [identifying
5 information redacted], excuse me, chronic
6 [identifying information redacted] failure can
7 lead to chronic, essentially end stage
8 [identifying information redacted] disease in
9 which a person's [identifying information
10 redacted] stop functioning entirely, and it
11 requires a person to go onto dialysis.

12 We would have to take -- like I said,
13 other things can cause chronic [identifying
14 information redacted] failure.

15 **DR. BEHLING:** Heavy metals are a key issue.
16 And for instance, when I looked at the Addel,
17 Fischer, Ron Kathrin article that was also
18 published in 1990, Health Physics Journal,
19 they looked at autopsy data years later. And
20 they say, well, there's no persistent
21 [identifying information redacted] damage
22 that's in evidence based on postmortem
23 analysis, tissue analysis. And that may be
24 true, but and obviously it's like a severe
25 sunburn. There comes a point when that skin

1 sloughs off, and you regenerate, and you look
2 as healthy as you were.

3 But a postmortem is not an indication
4 that there wasn't at least transient
5 [identifying information redacted] damage to
6 which time he was monitored for uranium
7 excretion. So I look at that data and say,
8 well, you can't argue with the facts. The
9 facts may not speak in total of the issues
10 that we're discussing here. That is, what
11 does [identifying information redacted] damage
12 do for periods of time during which you were
13 monitored for uranium excretion? And to what
14 extent does that [identifying information
15 redacted] damage impact the validity of that
16 uranium excretion in modeling internal
17 exposure?

18 **MR. GRIFFON:** I'm going to get an action
19 item out of this before lunch. So, Arjun and
20 -- I agree with Lew, but I think we've got to
21 define it a little better.

22 **DR. MAKHIJANI:** I think Sandra mentioned
23 that although NIOSH did have the information
24 about her [identifying information redacted]
25 that there was actually no adjustment done.

1 This is kind of, I would suggest that this is
2 a case study of NIOSH having information about
3 chronic [identifying information redacted]
4 damage, and there was no adjustment. So to
5 date there appears to be no procedure or
6 perhaps I'm mistaken. If there are procedures
7 for dealing with such a case when they're not
8 on dialysis --

9 **MR. SHARFI:** I have some clarification, and
10 I think Sandra can correct me if I'm wrong.

11 I believe they used OTIB-0002 on your
12 claim?

13 **MS. BALDRIDGE:** Right.

14 **MR. SHARFI:** So they didn't actually assess
15 bioassay. They used an overestimate to do her
16 case. So I don't want to say that they may or
17 may not have done, looked at that information
18 since they did what we consider an
19 overestimate approach. They didn't see the
20 need to make adjustments.

21 **DR. MAKHIJANI:** ^ an interesting case to
22 address.

23 **MR. MORRIS:** I'd keep a couple of points in
24 mind. One is that the threshold for permanent
25 damage in a 70 kilogram standard person is

1 about 40 milligram intake according to
2 Brotsky. That's a big number. And then I'd
3 also -- maybe you want to elaborate a little
4 bit on this, Mutty, but the idea that our
5 intake models have uncertainties built around
6 them, geometric standard deviations on our
7 input datasets. All are intended to
8 accommodate the variability in the human
9 condition compared to the standard model. Am
10 I right?

11 **MR. SHARFI:** Correct.

12 **MR. GRIFFON:** And that's in your response,
13 this GSD accommodates, although I'm not sure
14 about this three number. We've disputed this
15 before. And Owen Hoffman has also supported
16 my argument of for some nuclides it's probably
17 a little higher. But anyway, aside from that
18 this GSD accommodates wide population
19 variability in biokinetics. But that's wide
20 population variability, that's not really
21 referencing someone who has medical evidence
22 of a [identifying information redacted] ^.

23 **MR. MORRIS:** That is ^ that population,
24 isn't it? I mean, that person is sort of the
25 three or four sigma out on the curve of

1 [identifying information redacted] function.

2 **MR. GRIFFON:** Well, I would argue that this
3 GSD sort of covers your variability of a
4 normal population. I think that's the way
5 it's always --

6 **MR. MORRIS:** Multiply your three.

7 **MR. GRIFFON:** Yeah, yeah, I know. But the
8 question here, and I'm reading that first
9 line. I think, "By law, NIOSH uses the
10 latest," I'm not sure it says biokinetic
11 models in the law. It's in the regulation
12 actually. I think it should say by
13 regulation. It doesn't say ICRP.

14 **MR. ELLIOTT:** It says consensus models.

15 (Multiple speakers)

16 **MR. GRIFFON:** But ICRP does allow for
17 adjustments. I'm not sure if allows for
18 adjustments for, I don't think it, I think
19 it's silent on the [identifying information
20 redacted] failure or chronic.

21 **DR. WADE:** But this is an important issue.

22 **DR. BEHLING:** No, I think if you look at
23 excretion values from your ICRP, based on sub-
24 toxic levels of intakes.

25 **MR. GRIFFON:** No, no, no, but I'm asking if

1 the ICRP document ^ allows for, they allow for
2 effect modifiers for certain other things. I
3 don't know if it's in that. So I guess the,
4 what I'm trying to understand is what should
5 the action be for NIOSH because, you know, Lew
6 said NIOSH needs to follow up and just what
7 are we asking them to do? Because right now
8 they don't have the medical records in the DR
9 files, so they would have no way of finding
10 out if someone had medical evidence of any
11 problem.

12 **DR. ZIEMER:** Well, it seems to me we ought
13 to ask it in a generic way and not link it,
14 for example, to a particular case. The
15 question is more along the lines of what, how
16 do you conduct an internal dose reconstruction
17 in cases where there is a medical condition
18 that can impact the excretion? Or there's
19 damage to, in this case the [identifying
20 information redacted], but you could ask the
21 same thing from fecal excretion or maybe even
22 on lung if the person has --

23 **MR. GRIFFON:** And the lung's a good example
24 actually because I've asked for this before.
25 Because ICRP does allow for effect modifiers

1 for smokers. So we sort of in the epi model
2 we sort of take away risk or attribute it to
3 smoking and not to radiation, but we don't add
4 it in for the ICRP side. So it does allow for
5 that.

6 **DR. ZIEMER:** The reason we can do it for
7 smokers is that we have pretty good risk data
8 for smoking, but for other --

9 **MR. GRIFFON:** But we don't do it for smoking
10 by the way. You're thinking of the risk side,
11 not the dose side.

12 **DR. ZIEMER:** It's not the dose side. It's
13 in the final analysis that we --

14 **DR. WADE:** This is a very broad question
15 here about the ability to estimate dose for
16 any member of the class. You're going to have
17 to get to the intellectual issue of if
18 potential members of the class are in some way
19 physically impaired, how do you deal with
20 that?

21 **DR. ZIEMER:** Well, I'm not sure you can ask
22 it quite that way. It's got to tie in with,
23 for example in this case, I think the organ of
24 interest that's causing the excretion if it's
25 damaged somehow. Not simply that the person's

1 impaired.

2 **DR. WADE:** Well, if you're using certain
3 bioassay information as the underpinning of
4 your determination, then the issue really goes
5 to any condition that could call in question
6 the validity of that bioassay.

7 **MR. ELLIOTT:** You don't want to
8 underestimate the dose, but you've got to,
9 there's a logical constraint that would retain
10 dose in the body. You want to avoid
11 underestimating that. But I'm clear on, we
12 don't have a current, I don't believe a
13 current --

14 **DR. ZIEMER:** And it may be that it's not
15 doable.

16 **MR. ELLIOTT:** What would we use? I'd like
17 to follow that. If the output all of a sudden
18 decreases dramatically, we go from a liter and
19 a half a day to less than ten, what does that
20 trigger? How do you use that? How do you
21 look at that and say, well, am I going to look
22 at the internal bioassay data different now,
23 urinalysis data different now? I don't know.

24 **MS. BRACKETT (by Telephone):** This is Liz
25 Brackett. I'm the principal internal

1 dosimetrist for the project.

2 **MR. GRIFFON:** Hi, Liz.

3 **MS. BRACKETT (by Telephone):** Hi.

4 **DR. WADE:** Please speak up, Liz, okay?

5 **MS. BRACKETT (by Telephone):** We haven't
6 looked at the [identifying information
7 redacted] issue with uranium, but on occasion
8 some unusual circumstances come up. And not
9 that long ago there was a person had had 95
10 percent of their pancreas removed, and I
11 believe it was pancreatic cancer in that case.
12 And we do have a medical doctor on staff, and
13 when something like that comes up, we check
14 with him to get his opinion --he's also a
15 Health Physicist -- to get his opinion on what
16 kind of impact, if any, it would have on the
17 case. We don't have any specific procedures
18 for this in place, but on particular
19 occasions, we have checked with him. But I
20 think something like this would be on a case-
21 by-case basis certainly, and we might have to
22 check with additional experts to --

23 **DR. ZIEMER:** And that may be the answer
24 itself. At least if you --

25 **DR. WADE:** And that presupposes that you

1 have the information available to know.

2 **MS. BRACKETT (by Telephone):** Yes.

3 **DR. WADE:** All this needs to be thought
4 about and put together in a cogent
5 presentation.

6 **MR. ROLFES:** Once again it does get back to
7 looking at all of the evidence that we have,
8 all of the information for a particular
9 claimant. And these things are, in fact,
10 mentioned in telephone interviews and worker
11 histories.

12 **DR. WADE:** Well, an excellent point has been
13 raised. It needs to be addressed. Where is
14 the work group on this?

15 **MR. GRIFFON:** I know. I'll work on this
16 over lunch. I'll work on an action item
17 statement, and then when we come back we can
18 summarize. And I'll get with Mark and others
19 on the side.

20 **MS. BRACKETT (by Telephone):** Can I mention
21 one more thing? This isn't directly related.
22 It's related to something that Arjun said
23 several minutes ago about the excretion curve
24 for the individual who had [identifying
25 information redacted] damage where the uranium

1 was very low at first and dropping and then it
2 came back up again and --

3 **MR. GRIFFON:** I think that was Hans that
4 said that.

5 **MS. BRACKETT (by Telephone):** Right, well,
6 that's not a unique instance actually. We're
7 looking at this for Atomics International or
8 it's Santa Susana, whatever it's called now,
9 but there was a paper published. It was
10 specifically exposure to uranium aluminide,
11 but that was found to exhibit that pattern
12 where it drops for awhile. It appears to be
13 insoluble at first, and then it starts
14 increasing after, I think, 30 or 40 days, and
15 it continues to rise for quite some time
16 before dropping off again. So it's not
17 unheard of to have a pattern like that, and
18 maybe we're looking at something like that
19 here.

20 **DR. BEHLING:** And, Liz, this is Hans. I
21 think you're correct. The issue here is one
22 of uranium tetrachloride which most, I think
23 NIOSH regards this as Type M or Class W. In
24 looking at the toxicological profile, they
25 view uranium tetrachloride as a very insoluble

1 form of uranium.

2 **MR. ROLFES:** Moderately soluble.

3 **DR. BEHLING:** More so than you would expect
4 as a Class W or an M, somewhere in between M
5 and S.

6 **MR. ROLFES:** It's a moderately soluble
7 material.

8 **DR. BEHLING:** Yes, yes, and it may --

9 **MR. ROLFES:** So it falls in between highly
10 soluble --

11 **DR. BEHLING:** Yeah, it may very well explain
12 the slow dissolution in the lung fluids that
13 transfer to the blood stream, and of course,
14 the excretion subsequently. And I looked at,
15 for instance, the ICRP model, and I think they
16 basically assume everything goes in a
17 solution. It's a flaw in the data. And if
18 you look at that curve that I enclosed as one
19 of the exhibits, it's always highest days
20 first 24 hours, and it may not necessarily be
21 the way the real data demonstrates excretion.

22 **MR. ROLFES:** The highest data, you know, for
23 a highly soluble compound such as uranium
24 hexafluoride would likely be in the first day
25 or two.

1 **DR. BEHLING:** Yes.

2 **MR. ROLFES:** However, with less soluble
3 compounds, you are certainly going to see an
4 increase in excretion rates. And certainly
5 with this individual if he received medical
6 treatment, he was probably going to be
7 eliminating. I don't know if he was getting,
8 like bicarbonate can be used as a chelating
9 agent for uranium compounds. He could have
10 been given bicarbonate, and bicarbonate
11 intravenously in order to try to treat the
12 symptoms. So I'd have to take a look.

13 **DR. BEHLING:** Well, also, one final
14 statement before we go to lunch, I assume.
15 That is to correct the record. I think Mark
16 made a comment that this individual suffered
17 from an extreme case of oliguria, which is a
18 reduction and complete loss of urine. That is
19 not the case for this one. You were quoting
20 case number [identifying information redacted]
21 which I should have basically deleted.

22 The case number [identifying
23 information redacted] was a serious injury;
24 whereas, the uranium was actually transferred
25 through an open wound. He was burned over 70

1 percent of his body, and I'm looking here at
2 the data. I didn't remember anything that you
3 mentioned, and I'm just now going through it.
4 And it says here that the issue of ten
5 milliliters for the 24-hour period on the day
6 seven. That was not this particular case. So
7 I just wanted for the record.

8 **MR. GRIFFON:** This is included as
9 attachments in your paper?

10 **DR. BEHLING:** Yes.

11 **MR. ROLFES:** I'm looking at page ten, Hans.
12 Can you take a look at page ten? I do have,
13 it does indicate that this individual
14 underwent urinalysis, kidney and liver
15 function tests and analysis of urine for
16 protein.

17 **DR. BEHLING:** Yes, and the tables, Table 1,
18 that shows the times during which these tests
19 were done and the duration during which this
20 [identifying information redacted] failure or
21 reduced [identifying information redacted]
22 function persisted to 04.6 for his exposure.
23 But the issue of oliguria that you're
24 referring to really is on page 12, and it's
25 defined on the second page.

1 **MR. ROLFES:** But oliguria is indicative of
2 proteins in the urine.

3 **DR. BEHLING:** Yeah, but you mentioned that
4 this person would have been instantly flagged,
5 based on the fact that his urinary output for
6 24 hours was ten milliliters. This was not
7 the case ^.

8 **MR. GRIFFON:** Okay, I think we all agree
9 there's going to be an action. I'll work over
10 lunch on the wording of the action, but that
11 brings us through Finding number one. I think
12 we're finished.

13 **MS. BEHLING (by Telephone):** Excuse me, this
14 is Kathy Behling. Can I, before we leave this
15 first finding, can I ask one more basic
16 question, everybody there?

17 **MR. GRIFFON:** Yes, we're here.

18 **MS. BEHLING (by Telephone):** I didn't know
19 if you have shut me off by now. We talked a
20 lot today already about looking at individual
21 cases and things on a case-by-case basis and
22 bounding doses based on individual records and
23 so on. And I just want to be sure that we can
24 feel confident that based on the data that
25 that dose reconstructor is going to have in

1 the individual's file, we will be able to
2 identify this individual, let's say, as a
3 thorium worker or as a person that may have
4 been involved in these campaigns where there
5 were higher enrichments of uranium and so on.

6 And the reason I say that is I heard
7 Mark, I believe, indicate earlier that you
8 have compiled some lists from logbooks of
9 individuals in the early days that may not
10 have had lung counts, and a lung count may not
11 be in that individual's record that indicates
12 that he was a thorium worker, but instead you
13 have a list from a logbook. In looking over a
14 lot of the dose reconstruction records, I
15 don't always see those types of lists in an
16 individual's record, and do we have the
17 confidence that the dose reconstructor is
18 going to know this individual does fall into
19 one of these categories where we have to look
20 at him a little closer?

21 **MR. ROLFES:** I'd like to make a
22 clarification for the record that these are
23 not logbooks that we reviewed. These are the
24 mobile in vivo radiation monitoring laboratory
25 results that we have associated with an

1 individual's claim.

2 **MS. BEHLING (by Telephone):** Although I
3 thought you indicated that for the earlier
4 years, people did not have the lung counting
5 data, and that you were looking at air
6 sampling data and logbooks for air sampling
7 data to identify who these individuals were.

8 **MR. ROLFES:** That's correct. For 1965 in
9 plant one there are a couple of individuals
10 that were working with some enriched material
11 that exceeded our standard default in the
12 technical basis document. Those individuals
13 were, in fact, given lung counts at a later
14 date, approximately two-to-three years after
15 working on that campaign. These individuals
16 are documented. In fact, we have the
17 enrichment information associated with that.

18 Without getting into other additional
19 information that was not part of the routine
20 dosimetry program at Fernald, there was an
21 aspect of research and development to quantify
22 historical exposures that was ongoing at
23 Fernald for many years before the in vivo unit
24 did come. If we can wait until after lunch, I
25 guess, to have that discussion, we'll be able

1 to give it the time it deserves and fully
2 elaborate on what, in fact, took place prior
3 to the mobile in counter being onsite.

4 **MS. BEHLING (by Telephone):** Okay, thank
5 you.

6 **DR. WADE:** For lunch, what time do you want
7 to be back?

8 **MR. CLAWSON:** Well, looks like now about
9 1:30.

10 **DR. WADE:** Okay, we're going to break for
11 lunch. We're going to break the phone line,
12 and we'll dial back in several minutes before
13 1:30. Thank you.

14 (Whereupon, the work group broke for lunch
15 from 12:25 p.m. until 1:35 p.m.)

16 **DR. WADE:** We're back on.

17 **MR. CLAWSON:** First of all over lunch we
18 were supposed to kind of word this.

19 Mark, did we come up with something?

20 **MR. GRIFFON:** Yeah, we got it. I was
21 talking with Paul a little bit and Arjun about
22 some language here. This would go under
23 number seven I guess as a follow-up action.
24 It says NIOSH will provide a response
25 outlining their approach for evaluating

1 internal dose in cases where uranium exposure
2 may have caused sufficient renal damage to
3 affect biokinetic models. I'll put it in the
4 matrix written out, but I mean I guess we
5 thought about this for awhile -- Paul, you can
6 chime in -- but I guess rather than trying to
7 be proscriptive, we said let's keep it broader
8 and ask NIOSH how are you going to handle this
9 type of situation with fairly broad
10 parameters. Although we did limit it to any
11 cases where uranium exposure may have caused
12 renal damage that could have affected the
13 biokinetic model.

14 **DR. ZIEMER:** And we understand the possible
15 answer is we can't do this. I don't think we
16 want to predetermine that we know the answer,
17 and we're looking to see whether you come up
18 with it or not.

19 **MR. CLAWSON:** But also, too, on the same
20 sense, what would trigger them to look at
21 something like this, and that's where --

22 **DR. ZIEMER:** I think that's kind of a
23 subsequent question. If they say here's how
24 we could address this, then we might say,
25 well, how do you find out that the condition

1 exists even. It seems to us, I think we felt
2 that that was like a follow up, or they may
3 want to include it. But at this point until
4 they say, yes, we have a way of addressing the
5 issue, then we say, well, okay, how do you
6 find out that it actually exists for a person.

7 **DR. WADE:** You're asking about approach
8 generally, Mark? Is that --

9 **MR. GRIFFON:** Yeah, we started brainstorming
10 like what triggers and things like that. And
11 then we said wait a second. Let's step back
12 and just ask NIOSH.

13 **DR. ZIEMER:** Well, is there a way of
14 handling this?

15 **MR. GRIFFON:** I'll say it again --

16 **MR. PRESLEY:** Can you read it again?

17 **MR. GRIFFON:** Yeah, NIOSH will provide a
18 response outlining their approach for
19 evaluating internal dose in cases where
20 uranium exposure may have caused sufficient
21 renal damage to affect the biokinetic model.

22 **DR. ZIEMER:** If you say, well, we really
23 can't do that, then it doesn't matter whether
24 you can get the information or not.

25 **DR. WADE:** But if NIOSH can do it, then I

1 would assume they would interpret the word
2 approach then to talk about the trigger
3 mechanism.

4 **MR. GRIFFON:** Right.

5 **MR. PRESLEY:** And the word uranium in there
6 then ties it down to a rad worker.

7 **DR. ZIEMER:** Rad worker and renal damage.
8 We didn't feel like we wanted to get into the
9 issue of thinking about all possible chemicals
10 that could cause renal damage in the workplace
11 which really goes beyond the scope of this
12 Board I think.

13 **DR. WADE:** I think that's reasonable.

14 **MR. GRIFFON:** That was our attempt to kind
15 of keep it broad enough to let, because we
16 didn't want, well, it's not our role to sort
17 of weigh in on how we think the approach
18 should be, rather just to ask the question.

19 **MR. ELLIOTT:** Mark, do you see this as
20 feasible or reasonable?

21 **DR. ZIEMER:** Well, and sort of are we asking
22 the right question?

23 **MR. ELLIOTT:** Are we asking the right
24 question and can we produce an answer?

25 **MR. ROLFES:** But what I think would be

1 helpful for us is to take a look at the
2 specifics of the case study that was evaluated
3 by SC&A and see how we would reconstruct that
4 individual's dose and see if, know what our
5 estimated intakes would be versus what his
6 true exposure was.

7 **DR. ZIEMER:** Well, we didn't want to tie it
8 to --

9 **MR. ELLIOTT:** There are other ways we want
10 to look at this, but that's one way.

11 **MR. GRIFFON:** Maybe look at that case and
12 should say with our claimant favorable
13 approaches, we would have done this; and
14 therefore, we're okay with these, just
15 acknowledge, you know. I don't want to
16 suggest an answer.

17 **DR. ZIEMER:** Unless Mark has some other
18 thoughts in mind.

19 **MR. ROLFES:** I think we can have some
20 discussions with our medical doctor on the
21 project and see what he would recommend that
22 we do or potentially give us his input as a
23 path forward for evaluating this.

24 **MR. ELLIOTT:** Well, I'd also like us to in
25 this look at whether or not the uncertainty

1 that we assign under our geometric standard
2 deviation covers this because we're using a
3 model that's developed against a standard man
4 that has an uncertainty associated with that.
5 And does that uncertainty include this kind of
6 example? I won't say it's a rare, but it --

7 **MR. GRIFFON:** That's why we tried to keep it
8 broad so that you have flexibility in how you
9 want to respond to it.

10 **DR. ZIEMER:** And it may be that Liz
11 Brackett's comments, maybe an approach like
12 that is another possibility that might be
13 included it seems later.

14 **MR. ROLFES:** We'll definitely pursue this
15 issue and look into it further. We weren't
16 able to put anything too substantive together,
17 you know, in immediate turnaround so certainly
18 we want to make sure we give the time that it
19 certainly deserves.

20 **MR. CLAWSON:** Okay, I think that will take
21 care of, was it number seven?

22 **DR. BEHLING:** Well, number seven of Finding
23 1.

24 **MR. CLAWSON:** Yeah, number seven of Finding
25 1.

1 Now, earlier today we didn't want to
2 get sidetracked or anything, but we kind of
3 sidestepped the thorium issue. And did we
4 want to try to address that?

5 **MR. GRIFFON:** Well, I think it comes up in a
6 later finding.

7 **FINDING 4.1-2**

8 **MR. CLAWSON:** Okay, so if we want to move
9 on, Hans?

10 **DR. BEHLING:** Yeah, Finding 2, again, I'll
11 summarize it. It's described in our review
12 report on page 26, and the title of the
13 Finding is "The Questionable Integrity of
14 Fluorophotometric Urinalysis Data". And I
15 referenced this whole thing with the statement
16 that there's reason to believe or concern
17 about the integrity of reported results that
18 reflect the perceived role.

19 And the word I want to focus on is the
20 perceived role of the urinalysis program by
21 the Health and Safety personnel at Trent*. I
22 think it's very important to look at that.
23 I'm not questioning the validity of the
24 fluorophotometric method as a diagnostic tool
25 or a bioassay tool for assessing internal

1 exposure. But some of the things that
2 disturbed me when I read some of the documents
3 which are enclosed herein as exhibits.

4 And I will just read to you from one
5 of the statements that was among all the
6 people who would make that statement and was
7 Director of Health and Safety himself who
8 stated that we use urinary uranium excretion
9 information along with air survey information
10 to be sure that we're controlling airborne
11 exposures to the amounts that will not be
12 harmful. And then he goes on to say we do not
13 consider the urinary uranium excretion
14 measurement as an accurate measurement of
15 estimating either body burden or exposure.

16 And, of course, that flies in conflict
17 with the way NIOSH is currently using the
18 data. We're saying the uranium urinalysis
19 bioassay data is our principal way of doing
20 dose reconstruction, and air monitoring may be
21 a supplementary way of looking at that data
22 and saying is there a consistency here. And
23 again, I don't want to necessarily tend to
24 discredit the concept of fluorophotometric
25 measurements, but when I see or read a

1 statement of this nature, my question that I
2 have to raise is to what extent that they
3 really take this issue seriously.

4 To what extent were procedures
5 necessarily followed when the Director of
6 Health and Safety makes such disparaging
7 comments? And this was not the first and only
8 time. There are multiple documents that I
9 read through that says it's basically almost a
10 waste of time to even pursue urinalysis.

11 **MR. ROLFES:** We addressed this at the last
12 discussion. This is because the biokinetic
13 models that we have today were not available
14 at the time to do a detailed assessment. They
15 collected the data, and the data is good and
16 sound. And there's nothing that prevents us
17 from using those data with current biokinetic
18 models to accurately assess an individual's
19 radiation exposure from those uranium
20 urinalyses results. ^ previous discussions.

21 **DR. BEHLING:** I know that. And as I said, I
22 don't want to discredit the concept of using
23 the data, but I do have to raise some
24 questions about how the Director viewed the
25 data and to what extent that filtered down to

1 people who were running the laboratory. Did
2 they really take it seriously; did they use
3 the standards that they were supposed to? Did
4 they calibrate the instruments?

5 Did they do all those things if the
6 perceptions were -- but we're wasting our time
7 because we have no use for the data. And
8 you're right. On the other hand I will even
9 take exception to that because ICRP 2 came out
10 in 1959, and some of these documents I'm
11 looking at, this first one I'm quoting, was
12 1963. So they could have had at least some
13 reference point as to how to use the urine
14 excretion data and using ICRP 2 models which
15 they chose not to do.

16 **MR. ROLFES:** Mutty, I heard you say
17 something. Is there --

18 **MR. SHARFI:** Well, ICRP 2 models are still
19 very limited in their ^. At that point their
20 workplace monitoring probably would have been
21 a better indication because trying to go from
22 urinary in a single compartment model that
23 ICRP 2 uses, trying to go from urinary
24 excretion all the way to intake is, there's a
25 lot more variability obviously because the

1 biokinetic models aren't as accurate as they
2 are, as we have today.

3 So they probably would rely more on
4 the field measurements because trying to use
5 the current models that they had at the time
6 wouldn't be probably as reliable given the
7 variability of this model. So I can
8 understand their point of view that they
9 didn't, that he felt they put more reliance on
10 their field measurements than they would on
11 the bioassay model.

12 With all of that said, I think also in
13 the NIOSH response they quote that even in '53
14 when they did a QA analysis, the QA results
15 were very consistent. So there's no
16 indication from QA, for the Quality Assurance
17 Program that their process in analyzing the
18 urinalysis results had any lack of enthusiasm
19 to do a quality job.

20 **MR. ROLFES:** There were also some concerns
21 about the amount of uranium that was, in fact,
22 in people's bodies, being retained in people's
23 bodies. And it is discussed in documents.
24 And there were mobile in vivo results that
25 were brought on. So the mobile in vivo system

1 was brought on to ensure that previous
2 exposures were not accumulating, you know,
3 significant amounts of radioactive material
4 were not accumulating in individuals' bodies.

5 Bryce.

6 **MR. RICH:** And the point is I think that the
7 fact that they were religious, and it was
8 important to them from an industrial hygiene
9 standpoint to collect samples, which they did.
10 The samples were taken. They were analyzed in
11 order to provide toxicological assurance that
12 they weren't exceeding the limits. So the
13 samples were taken, and now we're using the
14 samples for a radiological standpoint which is
15 legitimate.

16 **DR. BEHLING:** But as I said, the quotation I
17 gave you was in 1963. But if you go to page
18 26, the bottom, and then continue on page 27,
19 there are multiple other quotations that you
20 can look at that reflect time periods of '69,
21 '73, '79, '84 and '88. So it seemed to have
22 gone far beyond the point where urinary data
23 should have been used as a way of assessing
24 body burdens and lung burdens when, in fact,
25 they were not used.

1 And, of course, at that time ICRP 30
2 had been issued and more refined models. And
3 to me it's somewhat mind boggling to think
4 that they had this view that urinalysis data
5 was nothing more than a way of confirming that
6 air monitoring data was the best approach to
7 safeguard worker exposures.

8 And I'm not saying anything can be
9 done at this point. Obviously, it would be at
10 least it's my opinion and the working group
11 can make a different statement. But it's my
12 opinion that, yeah, urine data should be used.
13 In fact, I have a very, very questionable
14 attitude about air monitoring data that we'll
15 get on later. So at this point it's the
16 lesser of two evils to rely on urine data. So
17 I'm afraid we're left with this, and based on
18 our finding under number one, let's try to use
19 that as best as we know how.

20 **MS. BALDRIDGE:** I have a question for Mark.
21 In the records, the artifact records, that you
22 went through, did you go through any artifact
23 records?

24 **MR. ROLFES:** Artifact? I'm not sure what
25 you're referring to.

1 **MS. BALDRIDGE:** Well, those would have been
2 for, I assume they matched from the time the
3 plant opened, the '50s and so forth, for the
4 workers. Did you, checking back on those
5 records, did you ever see any notations made
6 on the records that they were, that they
7 couldn't be used or why they couldn't be used?

8 Because there's a document in the
9 petition where it states that they never used
10 results for estimates to confirm exposures
11 referring to the uranium urinalysis. And that
12 if artifacts are discovered, a notation that
13 the count results are unreliable is made in
14 the worker's record. Did you come across any
15 of those?

16 **MR. ROLFES:** I really would have to take a
17 look at the context of what you're referring
18 to. I'm not sure that I've seen a notation.

19 **MS. BALDRIDGE:** I think it was a response to
20 a questionnaire that was submitted about the
21 records at National Lab of Ohio.

22 **MR. ROLFES:** There are some indications, for
23 example, for the mobile in vivo unit. There
24 were some reported indications that there were
25 some bad runs that were conducted in the in

1 vivo unit. And I've certainly seen notations
2 of those bad runs associated with anomalous
3 results. And the individual was, in fact, re-
4 counted after that anomaly.

5 **MR. GRIFFON:** I guess my concern on this
6 finding is more of the question of the data
7 integrity rather than, I mean, these memos,
8 we've seen memos like this before, and I tend
9 to, from what I've reviewed anyway at other
10 sites, too, I tend to agree with what Mutty
11 said, that that was sort of what they were
12 suggesting in their memo. But I think in
13 looking at our actions, one of the other sub-
14 pieces, and I've probably interjected this
15 because it looks like something I might have
16 done.

17 But the question on the database and
18 the actual urinalysis data, and again, I go
19 back to our Board procedures, that we have to
20 review the data integrity. So we're looking
21 at both the data integrity for individual
22 claimants as well as in the database where it
23 would be for the coworker model. And I guess
24 in those two actions, number two and three, if
25 you clearly provided HIS-20, I have that.

1 I've at least looked at it a little bit.

2 I don't know how much of it you all
3 have had a chance to, in number three I must
4 admit, I'm sure you posted it in there, but
5 can you just maybe outline for us, Mark, what
6 you were able to find with regard to the
7 urinalysis logs or documents?

8 **MR. ROLFES:** Let me see if I --

9 **MR. GRIFFON:** And then I think the obvious
10 next step is we've got to marry those two
11 somehow. And I think we have to ask SC&A to
12 look at that.

13 **MR. ROLFES:** I believe that Gene Potter had
14 a little bit to -- some of what had been done
15 initially. We used the data that was existing
16 on our Site Research database at the time. We
17 have been in the process of making a request
18 to go back and look for additional urinalysis
19 records, urine cards, urine sample request
20 cards. And as soon as we receive those back,
21 we'll be able to compare the data between the
22 urine cards and HIS-20.

23 Based on what we've done so far, for
24 example, you know, for the other radionuclide
25 issues that typically are identified by the

1 Advisory Board, I can say that the results
2 that we have cross-checked between HIS-20 and
3 the urine sample cards were very, very well
4 correlated.

5 So even for something that was not
6 routine at the site, they did document things
7 very well. So we're still in process with
8 this, and we'll be pursuing additional
9 urinalysis results in comparison so that we
10 get a representative sample over the
11 histories.

12 **MR. GRIFFON:** I mean, on your follow-up
13 number three can I just ask that you, it
14 doesn't have to be now, but can you include
15 when we edit this response, the reference ID?
16 It says Ref. IDs for some urinalysis logs.
17 Just make it easier for us to track so we have
18 the document numbers. If you can
19 parenthetically --

20 **MR. ROLFES:** Sure, sure.

21 **MR. GRIFFON:** -- put the numbers in there,
22 then we can keep track of that.

23 **MR. ROLFES:** I have a partial list of some
24 of the urine cards here. If you'd like me to
25 read those into the record, I can.

1 **MR. GRIFFON:** Yeah, maybe you shouldn't for
2 Privacy Act, but if you can add them to the
3 matrix we can go from there.

4 And then the -- go ahead.

5 **DR. ZIEMER:** Are you talking about these --

6 **MR. GRIFFON:** SRDB Reference IDs for some
7 urinalysis logs. Yeah, those are okay. Those
8 aren't ^.

9 **DR. ZIEMER:** In the HIS-20 database, which -
10 -

11 **MR. GRIFFON:** I'm on NIOSH response number
12 [identifying information redacted] under
13 Finding 41-2.

14 **DR. ZIEMER:** Oh, oh, the logs. Are those
15 logs separate? Are they on the O drive?

16 **MR. ROLFES:** There are urinalysis results
17 that are separate from HIS-20 urinalysis
18 results which we were asked to inter-compare.

19 **MR. GRIFFON:** This is sort of the raw data
20 comparing to the electronic database. And I
21 just asked just for simplicity to put the
22 reference numbers in there so we can find them
23 easier. Make it a lot easier to --

24 **DR. MAKHIJANI:** Mark, were you assigning us
25 something or --

1 **MR. GRIFFON:** That was my next question is I
2 would think -- and this is a work group
3 decision -- but I would think we can either
4 wait for NIOSH to produce a report or we can
5 have SC&A do an analysis of this in parallel.
6 And I don't know what, you know, I guess
7 that's for us to discuss and decide. But if
8 we want to be timely about this, we might want
9 to consider having SC&A, if there's enough
10 logbooks, I mean, I guess the question gets
11 back to you're still looking for urine cards
12 so there could be this kind of, I don't want
13 to double work.

14 Like if SC&A looks and says we only
15 found urine cards covering these years, and
16 NIOSH says, well, we told you we were coming
17 back with more, you know, and here they are.
18 I don't want to make double work on this. So
19 does it make sense to do this in parallel, or
20 do we have to wait until NIOSH, I think we
21 might have to wait at least until NIOSH posts
22 all the logs they could find in their source -

23 -

24 **MR. ROLFES:** All the logs that we can find?

25 **MR. GRIFFON:** No, no, all the logs that

1 **MR. GRIFFON:** I think what we should do just
2 to, I think we can put an action in here for
3 SC&A but also make it very clear that, I guess
4 I don't want to wait until we have another
5 official meeting necessarily, but I also want
6 to move things along. So if we said that once
7 NIOSH, upon completion, SC&A will review or
8 we'll do an assessment of this as well, you
9 know, upon NIOSH's completion of the above
10 action items, SC&A will conduct an assessment
11 of the validity of the urine data within the
12 HIS-20 database and within individual records,
13 something like that.

14 **DR. MAKHIJANI:** One of the things just to
15 ask Mark Rolfes, some of the raw data are
16 already posted, right?

17 **MR. ROLFES:** Yes, yes, that is true.

18 **DR. MAKHIJANI:** So without, you know, again,
19 since more data are going to be posted,
20 obviously we can't be conclusory in any sense,
21 but it may be possible depending on how much
22 is posted, and Mark Rolfes could just
23 eliminate this a little bit, to do some
24 preliminary verification and give you some
25 preliminary idea. I don't know what Hans

1 thinks, but I'm thinking that having gone
2 through this before, if everything matches,
3 then, you know --

4 **DR. ZIEMER:** Do we need to do 100 percent?

5 **MR. GRIFFON:** No, we certainly don't want to
6 do 100 percent.

7 **MR. ROLFES:** Like I said, what we've focused
8 on right now, what we have readily available
9 were primarily related to the plutonium
10 specification for urine samples that were
11 collected in the '80s.

12 **DR. MAKHIJANI:** Well, that's highly
13 selective.

14 **MR. GRIFFON:** Right. I think you have to at
15 least wait until more information is up there.

16 **MR. ROLFES:** As I mentioned, those matched
17 up very well.

18 **MR. GRIFFON:** I guess I'm hesitant to,
19 thinking of our recent past where we had, you
20 know, Rocky Flats started with the one
21 Kittinger log, and everybody seemed like, oh,
22 this matches up very well, but then we found
23 many more logs that we had to go through. So
24 I think it might be worthwhile at least
25 getting more information posted that covered

1 the timeframes of interest, you know, a good
2 sampling that covered the time period from
3 some interest, operations of interest, and
4 then you can do your sampling after that.

5 **DR. MAKHIJANI:** Well, to go from experience
6 at other sites, it seems that this electronic
7 database has seemed to be more, they seem to
8 have gaps in the early years because of the
9 way they were compiled. The HIS-20 database,
10 you know, started in the '70s with
11 computerization, and then it was done for
12 people who were employed at that time. And
13 then so a lot of people fell into that net.

14 And we did this in the TIB-0052 review
15 when Steve Marschke and I, well, Steve
16 Marschke really looked at it, looked at the
17 data more than I did, but this came up. This
18 is a kind of a little bit of a systemic
19 problem but perhaps not at all sites. It may
20 not apply to Fernald. I don't know. But it
21 seems that people who stopped working before
22 the mid-'70s may not be there in HIS-20. Is
23 that true at Fernald?

24 **MR. GRIFFON:** I don't know if that was
25 unique to Rocky or, because they were pulled

1 out, right?

2 **DR. MAKHIJANI:** No, it's not unique to Rocky
3 actually. I think that problem is more so if
4 we're going to identify issues, then I think
5 it might be useful to have the logs that
6 relate to the '50s and '60s. If those could
7 be posted, then we could actually begin to ^.

8 **MR. ROLFES:** Certainly. I haven't done the
9 analysis to determine whether the people that
10 worked in the earlier time period were, in
11 fact, entered into HIS-20. We'd have to do
12 the analysis and certainly link that to
13 earlier time periods there might be more data
14 uncertainty.

15 **DR. MAKHIJANI:** I think it's simply my
16 understanding, and I think it's in our TIB-
17 0052 review, that it's my understanding that
18 typically when the records were computerized,
19 they computerized them for the people who were
20 working, for understandable reasons.

21 **MR. GRIFFON:** If they retired before a
22 certain point, they weren't in there, yeah.

23 **DR. MAKHIJANI:** They weren't in there.

24 **MR. GRIFFON:** Unless, and in Rocky Flats we
25 had it confounded by some people who were put

1 back in later when they came to the medical
2 screening program.

3 **MR. ROLFES:** An example you used, Arjun,
4 when you reviewed OTIB-0052 was not from the
5 HIS-20, but it was from the HPAREH from
6 Savannah River.

7 **DR. MAKHIJANI:** Yes, that's right. I was
8 remembering another database, but it was a
9 similar database. It was called something
10 else, but it was a similar electronic database
11 that was compiled in the mid-'70s. And then
12 there happened to be another, the Fairweather
13 database that had been compiled in the '50s
14 that had a lot of the data that was missing in
15 the HPAREH database.

16 **MR. ROLFES:** But we have to work it through
17 ^.

18 **DR. MAKHIJANI:** Right, we did.

19 **MR. GRIFFON:** So I guess I would suggest
20 maybe we put an action item that SC&A doesn't
21 act until NIOSH completes the above action
22 items. Does that make sense?

23 **DR. MAKHIJANI:** Yeah, if Mark and Hans and
24 me need to know --

25 **MR. GRIFFON:** The only reason I want to do

1 that is because if in three weeks you have
2 most of the logbooks posted, there's no sense
3 waiting until this work group meets again.
4 And then we assign SC&A, and then we're
5 another --

6 **MR. ROLFES:** Sure.

7 **MR. GRIFFON:** If we can try to keep this
8 moving that would be good. So, okay, I'll put
9 a --

10 **DR. ZIEMER:** Well, does SC&A have in mind
11 some sampling protocol so you don't do the
12 whole thing?

13 **DR. MAKHIJANI:** We've not in the past
14 developed a sampling protocol for HIS-20, a
15 more ad hoc --

16 **DR. ZIEMER:** It's going to depend on --

17 **DR. MAKHIJANI:** -- what we did at Rocky
18 Flats.

19 **DR. ZIEMER:** -- this database is developed.
20 I mean, it may be if it's small you can do 100
21 percent. But if it's like --

22 **MR. GRIFFON:** No, it's a big database.

23 **DR. ZIEMER:** -- if it's a big one, then
24 you're going to have to have some, we need to
25 give some guidance on how much either percent

1 wise or a certain number not to exceed
2 something or what are we talking about?

3 **MR. ROLFES:** Five hundred thousand.

4 **MR. GRIFFON:** Why don't we ask, as an
5 interim action we can ask SC&A to give us the
6 methodology.

7 **DR. ZIEMER:** Well, I want to keep it down to
8 at least 100,000.

9 **MR. GRIFFON:** I think that's fair. I think
10 we ask --

11 **DR. MAKHIJANI:** We can do what we did at
12 Rocky Flats when we examined individual cases.
13 We really wanted to limit it, and we only did
14 52 actually. And from the random it's just 32
15 cases. And then there were 20 sort of
16 symmetric from the high exposure group. In
17 that case what we did is we asked our
18 statistician, Harry Chmelynski, to develop a
19 protocol. And maybe as soon as the data are
20 posted, the first thing we could do is to have
21 Harry develop a sampling protocol.

22 **MR. GRIFFON:** Yeah, we'll do it in two
23 steps. Have SC&A submit a protocol, and then
24 after that we'll discuss that --

25 **DR. ZIEMER:** Then maybe they can come to the

1 work group and say here's what we propose.

2 **DR. MAKHIJANI:** And will that be done by e-
3 mail preferably or --

4 **DR. ZIEMER:** I would think so.

5 **MR. GRIFFON:** Yeah.

6 **DR. ZIEMER:** What do you think?

7 **MR. CLAWSON:** That's what I was going to
8 ask.

9 Mark, are you going to have any
10 problems with that? I guess I'm looking at
11 more timeliness and not so much data that --

12 **MR. ROLFES:** There's quite a large amount of
13 data, and it's the Advisory Board's, you know,
14 it's your, whatever you would like to do.
15 We're here to do what you ask us to do. If
16 you feel that the data integrity issue is
17 something that we should focus on, we'll be
18 happy to spend as much time as necessary, but
19 keeping in mind that we're trying to make a
20 timely decision on this.

21 **DR. ZIEMER:** It seems to me if the
22 statistician comes back and says something
23 like, well, if you look at 30 or 40 of these
24 and you don't see any discrepancies, that's
25 fine. But if they come back and say, you

1 know, you need to look at 586 samples, and we
2 need to think twice about the time and
3 resources.

4 **MR. MORRIS:** Well, keep in mind that we're
5 doing that now as NIOSH's work. So if you
6 want to duplicate it, that's a different topic
7 than just checking that we're doing it.

8 **DR. ZIEMER:** Yeah, it's actually kind of an
9 independent, yeah, you have to do the same
10 thing. It's kind of the issue of --

11 **MR. CLAWSON:** The independence.

12 **DR. ZIEMER:** -- of independence and --

13 **DR. MAKHIJANI:** In this piece though the
14 checking is not of the same type of the
15 completeness investigation at Rocky Flats.
16 It's quite different. Actually also that one
17 did not take a whole lot of time. We spent a
18 lot of time discussing it, but it didn't take
19 a lot of time.

20 **MR. GRIFFON:** The data completeness is
21 another thing.

22 **DR. MAKHIJANI:** In this case you're trying
23 to match individual samples, so doing a few
24 hundred is not going to be --

25 **MR. GRIFFON:** You're just looking at a raw

1 record versus a --

2 **DR. MAKHIJANI:** You're not actually trying
3 to compile everything for a claimant.

4 **DR. ZIEMER:** You can do that very rapidly.

5 **DR. MAKHIJANI:** Yes, I think even if we had
6 to do a few hundred, I do not believe that
7 matching up a few hundred individual bioassay
8 points would, electronically with the
9 logbooks, I think it could be done relatively
10 rapidly. It also would be done by a more
11 junior staff person also.

12 **MR. CLAWSON:** But we need to get the data
13 from NIOSH, correct?

14 **DR. MAKHIJANI:** Right.

15 **MR. CLAWSON:** So I guess my question is, is
16 as this comes available, could you make it
17 available to SC&A so we can do this check and
18 be able to take care of this?

19 **MR. ROLFES:** Yeah, the two reference IDs, I
20 believe, have been put on the O drive, and as
21 additional ones, I'll make sure I notify
22 everyone on the Advisory Board, everyone in
23 the working group.

24 **DR. MAKHIJANI:** My tentative thing would be
25 to focus initially after the mid-'70s and then

1 from the mid-'70s on as an initial parsing of
2 this.

3 **MR. GRIFFON:** As we usually would.

4 **DR. MAKHIJANI:** That might be a more
5 convenient way to do it and let the
6 statistician handle the numbers.

7 **DR. ZIEMER:** Actually, if the only thing
8 we're looking at is making sure the names
9 match, I'm not sure why we even have to sample
10 that.

11 **MR. GRIFFON:** Excuse me? I don't understand
12 what you're saying.

13 **DR. ZIEMER:** If we're not validating
14 anything computationally, if they come to us
15 and say everything matched up, I don't know --

16 **MR. CHEW:** I think you're asking the
17 question what are we really looking for,
18 right?

19 **MR. GRIFFON:** We're looking for what we
20 found at Rocky Flats because we had uranium
21 urine logs which there were values that were
22 not even in the HIS-20 database. And it ended
23 up that probably the reason for that was that
24 a lot of the early workers were removed.
25 There were explanations. I'm not saying that,

1 you know, but at least it raised that question
2 especially when you're using the database for
3 coworker models. That's where it really comes
4 into play is the coworker model stuff. So if
5 you're missing, I mean, worst case is you go
6 through and you, I mean, I wouldn't even do a
7 random selection of values although it's
8 SC&A's protocol. But I would go through and
9 see raw records and highlight high values. If
10 NIOSH is missing a lot of high values, then --

11 **DR. ZIEMER:** NIOSH will already have that
12 information at that point, will they not?

13 **MR. GRIFFON:** Well, NIOSH doesn't validate
14 any of this stuff. That's where we're at.

15 **DR. ZIEMER:** Yeah, but I thought they're
16 saying they'll be doing that as they go.

17 **MR. ROLFES:** Yes, we're internally doing
18 that already.

19 **MR. GRIFFON:** It's just another sampling of
20 the independence.

21 **MR. CHEW:** But I just want to make sure we
22 say it clearly. We're looking at individual
23 records here to assure that those sample
24 results are adequately put into HIS-20
25 correctly. Is that the two matching?

1 **MR. GRIFFON:** That there's a match between
2 raw records and HIS-20 records.

3 **MR. CHEW:** The raw records would be the
4 individual urine sample results that were in
5 the individual person's records. Does that
6 sound right?

7 **MR. GRIFFON:** Or the raw records, well,
8 you've got logbooks, too.

9 **DR. MAKHIJANI:** Oh, logbooks. I mean, one
10 would actually ideally look at both.

11 **MR. GRIFFON:** Although because I know, Mel,
12 sometimes, as you know, the individual records
13 are printouts of the database so I hesitate
14 there. That's why we go to these raw.

15 **MR. CHEW:** When you're talking about
16 logbooks, are you talking about the logbooks
17 of the person who actually did the analysis
18 and transcribed it? We got into this
19 discussion before with Y-12; I want to make
20 sure we know what we're looking for. I want
21 to make sure you're looking, we're looking for
22 the same thing here.

23 **DR. MAKHIJANI:** But there are a number of
24 issues. I mean, there's the issue that Mark
25 mentioned. From the mid-'70s onward usually

1 the individual records are just a printout of
2 the database that were computerized.

3 **MR. GRIFFON:** So we know they're going to
4 match.

5 **DR. MAKHIJANI:** Yeah, so they will match.
6 But sometimes there are also raw records, and
7 I imagine the practices were different at
8 different sites. So I don't know enough to be
9 able to generalize. I've looked at the data
10 in detail only from a few ^.

11 **MR. GRIFFON:** Right, I'm calling them, I've
12 been calling them urinalysis logbooks, but I
13 don't know if they had a logbook in the
14 laboratory where they recorded down each
15 reading or how they --

16 **MR. CHEW:** Remember back in the days we did
17 Y-12, the actual card and making sure that
18 that particular number got transcribed into
19 the database.

20 **MR. GRIFFON:** Right, and some of the cards I
21 think had ^ on them, too. And it could get
22 complicated, but you only need, like I said, I
23 think you look for, because remember what
24 we're trying to demonstrate for this purpose
25 anyway, this is not the data completeness

1 evaluation to show that all the individual DRs
2 you're doing have a complete enough set of
3 records that you can do a dose reconstruction.

4 This is a question of if we have to
5 rely on a coworker model, we know they're all
6 derived from the HIS-20. So we want to make
7 sure that you have at least enough of the high
8 values because you're always going to use the
9 95th or 50th, so you want to probably bias your
10 sampling toward higher numbers in the
11 logbooks. If most of them are there or all of
12 them are there, then you're fine.

13 **DR. ZIEMER:** I want to ask my question in a
14 slightly different way. NIOSH is doing a
15 statistical verification of this very thing.
16 Is that correct?

17 **MR. ROLFES:** Correct.

18 **DR. ZIEMER:** Are we asking that we verify
19 NIOSH's statistical sample, or do a separate
20 statistical --

21 **MR. GRIFFON:** I'm asking for an independent,
22 I would prefer independent.

23 **DR. ZIEMER:** Okay, that wasn't clear to me.

24 **DR. MAKHIJANI:** The purpose of it is to
25 ensure that in every period the coworker model

1 makes sense.

2 **MR. GRIFFON:** Is going to be, is bounding.
3 It makes sense, correct. It makes sense.

4 **MR. ROLFES:** I think you clarified it, Mark.
5 You want to assure that the high results are
6 adequately portrayed in the HIS-20 because
7 they will now bias the coworker study. I
8 mean, that's been the --

9 **MR. GRIFFON:** I think that's kind of a
10 bottom line issue because you're saying, I
11 mean, I don't want to go too far ahead because
12 I haven't seen the coworker model. I mean you
13 said it's almost ready, but I'm assuming that
14 generally you use the 95th for operational
15 people. So if it ends up looking like that, I
16 don't want to, maybe I should, but I don't
17 want to assume on internal.

18 **MR. SHARFI:** The standard model would be the
19 50th percentile with a distribution. We didn't
20 use the 95th at Rocky, but that was a special
21 situation because of other issues. The
22 internal we would assign the 50th with a
23 lognormal distribution.

24 **MR. GRIFFON:** So I guess still I don't think
25 it changes what you are going to look at

1 because I think you would tend to want to look
2 at the higher values because that's going to
3 probably shift the annual average and --

4 **MR. MORRIS:** The NIOSH approach is going to
5 be to use the middle standard sampling
6 protocol.

7 **MR. GRIFFON:** Okay, and I'll leave it up to
8 SC&A --

9 **DR. ZIEMER:** Give equal weight to
10 everything. You're not going to selectively
11 look at high values.

12 **MR. MORRIS:** No, we will not selectively
13 look at high values. We'll look at acceptance
14 criteria like making widgets. If you get the
15 first hundred widgets right, then you don't
16 sample the next hundred widgets with the same
17 vigor.

18 **MR. CHEW:** Does that answer Mark's question
19 though? I want to make sure that we --

20 **MR. MORRIS:** We're not going to bias. We're
21 going to take a random sampling.

22 **DR. ZIEMER:** A random sample.

23 Do you know at this point how many
24 samples you will be taking?

25 **MR. ROLFES:** Gene, are you available? Gene,

1 are you there?

2 **MR. POTTER (by Telephone):** Yes, sir.

3 **MR. ROLFES:** Paul Ziemer asked how many
4 samples we might be taking, and could you
5 relay some of the Mill Speck (ph) Sampling
6 Procedures that we're using to define the
7 acceptable quality level for the dataset?

8 **MR. POTTER (by Telephone):** Yes, we're just
9 adopting the protocol that has been used by
10 the ORAU team before in doing similar sorts of
11 things when records have been transcribed into
12 spreadsheets, for example. And this is
13 generally the old, old data. And basically,
14 you would define up front what an acceptable
15 quality level is.

16 In other words, for the Pu sampling
17 data that we talked about, Mark and I
18 discussed and decided that a one percent
19 acceptable quality level would be a value to
20 use. And that would say that 99 out of 100
21 results were correctly transcribed. And then
22 based on your batch size, and what these Pu
23 sample results were, were data sheets that
24 were transmitted to the site from offsite
25 labs. And that's why folks found them

1 convenient to capture the data in reference
2 IDs when they went out to the site.

3 So based on how many are in that
4 batch, you have look-up tables -- actually,
5 it's on the web -- for that acceptable quality
6 level. And then you, I won't go into all the
7 details, but there are different inspection
8 levels that you can define depending on what
9 you think the quality of your data is.

10 In other words, after you've done
11 several batches and the data appears to be of
12 a high quality, then you can reduce your
13 sample size. But this is all subject to very
14 strict rules. Anyway, from your acceptable
15 quality level, the batch size and you start
16 out with a normal sampling procedure that
17 tells you how big of a sample to draw. From
18 using that number I drew a random sample and
19 compared those results one by one to HIS-20.
20 Was the person there? Was the result there?
21 Was it correct? And if all that fell into
22 line, that was called an acceptable sample.

23 A couple of other observations since
24 I've been listening here. You all are very
25 correct that this is something that needs to

1 be checked because like most sites, HIS-20 is
2 at least the third generation of databases
3 that were used at Fernald. There's always the
4 possibility of things getting hosed up as data
5 is transferred from database to database. A
6 lot of the data was hand entered, the old
7 stuff, so there's a possibility of error
8 there. So that's another good thought to
9 check on all this stuff.

10 But I can tell you from what I've
11 looked at so far, there are many, many people
12 from the '50s that have urine results from the
13 '50s. And what I was suggesting that we go on
14 a decade-by-decade basis maybe. And at this
15 point we may not be able to pull all of the
16 samples from, say, like the 1960s and then
17 pick a random sample based on that batch size.

18 So probably what we're going to do is
19 pull a box or something of urine request
20 cards. This seems to be the record that's
21 identifiable in the site records as being
22 something close to like a logbook. In other
23 words, a lab person would enter the result on
24 this card, and this would be the reduced data
25 from, you know how photofluoric ramitry (ph)

1 usually works. They do three trials, and if
2 they're within a certain acceptable range of
3 each other, then they record the result of the
4 average of the three.

5 So this is reduced data already, but
6 there's not a lot of stuff that I saw in the
7 site records that identifies itself as a
8 logbook. So urine request cards are a
9 possibility. And what I suggest is a, you
10 know, from each decade we pull a box or so,
11 and then we pull a random sample from there.

12 **DR. MAKHIJANI:** May I ask Gene a question
13 since he's looked at '50s' data?

14 Did you find that there were, that
15 HIS-20 was complete in the '50s? Or did you
16 find all matches or did you find that there
17 were things in HIS-20 that didn't match up
18 with the cards?

19 **MR. POTTER (by Telephone):** I only have some
20 very preliminary results from the New York
21 Operations office samples that were done for
22 Fernald. And so I would like to see more of a
23 sample before I draw any conclusions on the
24 '50s' data. But a lot of it is there,
25 definitely.

1 **MR. GRIFFON:** Gene, this protocol you
2 described, you said it's on the web? Or is it
3 on our AB doc?

4 **MR. POTTER (by Telephone):** I did not see a
5 procedure; however, I've been involved in
6 doing some of the sampling a couple of times
7 in my previous career, and then once with the
8 ORAU team. And so I wrote down a little
9 procedure for myself which I certainly can
10 provide to Mark for --

11 **MR. GRIFFON:** That would be great if you can
12 provide that if that's okay, Mark.

13 **MR. ROLFES:** Sure.

14 **MR. GRIFFON:** And was this the same approach
15 you used for Rocky Flats? I'm just trying to
16 get a sense.

17 **MR. POTTER (by Telephone):** No, for Rocky
18 Flats we did not use a statistical method.
19 There it was kind of an agreement as I
20 understood it between yourself and Brant Ulsh
21 as to how many we would look at.

22 **MR. GRIFFON:** Okay, I think that gives us a
23 sense of where to go though.

24 **MR. CLAWSON:** Well, we've got a clear line
25 of direction, clear as mud. I was going to

1 ask that technical term of hosed up. That
2 sounds like something I'd say. But we've got
3 a clear line on this right now. I'll be right
4 honest. I'm lost.

5 **MR. GRIFFON:** I'm going to ask if we can go
6 back through the last, the four responses on
7 the Finding because I think we have a clearer
8 line for the database stuff. But I think it's
9 worth stepping back to number one.

10 Number one, we asked for QA reports,
11 and it looks like one from 1953 was
12 identified. But we asked for QA reports from
13 the early time period, '54 through '80. I
14 notice that the one we found was from '53. I
15 don't know. Now there's interviews. I guess
16 the statement here is a little concerning to
17 me, interviews with former FEMP workers
18 revealed an informal QC program exists. I'm
19 not sure what exactly that means.

20 **MR. ROLFES:** I can elaborate a little bit.

21 **MR. GRIFFON:** I guess you're also going to
22 provide these interviews so we --

23 **MR. ROLFES:** Yes, certainly. Yeah, there
24 were indications that prepared samples
25 essentially, samples that were spiked urine

1 samples that were put through as blind samples
2 to determine, you know, they would put a known
3 quantity of uranium into the sample without
4 giving any of the technicians who are involved
5 in doing the analysis on that urine, fake
6 urine sample, they would put that through as a
7 blind sample in every manner identical to a
8 regular urine sample to determine what the
9 results were.

10 **MR. GRIFFON:** Well, we haven't seen any --

11 **MR. ROLFES:** The interview transcripts will
12 be made available.

13 **MR. GRIFFON:** But did you find that in the,
14 it's not like you don't have any lab data that
15 you've seen?

16 **MR. ROLFES:** Well, we did provide the data
17 that we had record of, the formal record in
18 1953.

19 **MR. GRIFFON:** 'Fifty-three is the one that
20 was.

21 **MR. ROLFES:** Yes. However, we are aware
22 that this individual didn't start until about
23 I believe mid-to-late '50s. I could take a
24 look back at the transcripts and see. I don't
25 believe it was documented. I know there were

1 certainly much more documentation of it in
2 more recent years, but it does appear that it
3 was done, in fact, in 1953.

4 **MR. GRIFFON:** So in 1953 in the interviews
5 they're saying that it continued beyond that?

6 **MR. ROLFES:** Yes.

7 **MR. GRIFFON:** And do you have any of the, we
8 asked about procedures, too, laboratory
9 procedures?

10 **MR. ROLFES:** Yes, those have been made
11 available to the Advisory Board.

12 **MR. GRIFFON:** Oh, they are available.

13 **DR. BEHLING:** The ones that I've looked at,
14 the one was 1984, and the other one was '88.
15 It's obvious as time went by how things start
16 to get into more controlled and certainly much
17 more documented. But I guess as Mark was
18 saying --

19 **MR. GRIFFON:** Well, we said from the earlier
20 time period, too.

21 **DR. BEHLING:** But my focus would be in the
22 '50s and early '60s to see --

23 **MR. ROLFES:** If I recall, I believe there
24 were some from the '60s that we provided as
25 well. I can take a look back.

1 **MR. GRIFFON:** I didn't see that in your
2 response, so I'm not sure.

3 **MR. ROLFES:** Let me take a look through
4 here. I mean, there is quite a large number
5 of reports that were provided.

6 **MR. GRIFFON:** Yeah, I know. I'm just trying
7 to make sure we don't miss anything here as we
8 go through the actions.

9 I'll move on to number four. And I
10 was trying to refresh my memory on this
11 myself. NIOSH to complete or to compare
12 selective cases with lung count data and
13 urinalysis data. And it says in progress.
14 And I know that somewhere cases were
15 identified with elevated lung counts.

16 **MR. MORRIS:** Well, I think this was Paul's
17 suggestion that, and I volunteered that we do
18 have the in vivo lung count data. And in
19 there there are obvious cases of people who
20 were sampled seven or 12 or 15 times during
21 the year. We could potentially pull out a few
22 of those people and compare their urinalysis
23 data. I'm not sure what it gets us, but it's
24 ^.

25 **MR. GRIFFON:** Yeah, I was trying to remember

1 exactly why we wanted to do this, but it says
2 it's in progress, so I guess you're doing it.

3 **MR. MORRIS:** Yeah, it's on my to-do list so
4 it's going to get done eventually unless you
5 call us off.

6 **DR. BEHLING:** But as you mentioned, the
7 question is what does the --

8 **MR. GRIFFON:** This is the reality check.

9 **DR. BEHLING:** Yeah, but does it really
10 reveal anything? If you are exposed to UF-6,
11 you're going to see a lot of it in the urine.
12 If you're exposed to uranium oxide, you're
13 going to see it in the lung. And the two may
14 not have any relationship to each other. So
15 I'm not sure I know what to advise you and
16 what the point of that effort is.

17 **MR. MORRIS:** Sure, that's probably why it's
18 not complete.

19 **MR. CHEW:** We agree with you. It was your
20 Board action.

21 **DR. ZIEMER:** I don't actually recall what we
22 were trying to do there other than the fact
23 that you have some exceptions, but in fact,
24 there should be correlation in general on
25 these things.

1 **MR. MORRIS:** In fact, there should be some
2 correlation. I agree with you. How to
3 quantify that correlation is a hard question.
4 And we can record it, but whether we draw
5 conclusions from it is another question.

6 **DR. ZIEMER:** Well, for example, if you have
7 fluorometry data, you infer what's in the body
8 if that's all you have. If you have lung
9 data, you also infer what's in the body. So
10 both are used for that purpose. Do they
11 correlate? Well, maybe, maybe not. But, in
12 fact, what would you do if you have, as a
13 claimant, someone with both pieces of data?
14 What do you do?

15 **MR. ROLFES:** For example, in a dose
16 reconstruction what we would start off with
17 would be looking at the urinalysis data to
18 estimate their intake. And then if we were
19 doing, it certainly depends on the specifics
20 of the case, whether we're doing an
21 underestimate or an overestimate or a best
22 estimate.

23 And, for example, if we had an
24 overestimate case that we needed to complete,
25 what we would do is assign intakes based on

1 the urinalysis data and look at the mobile in
2 vivo data to determine whether the dose could
3 have been any higher than what we've assigned.
4 And if it is not, then that would be
5 sufficient for the uranium intake estimation.

6 On the other hand if we had urinalysis
7 data and we were doing an underestimate for a
8 claim, we would use those urinalysis data to
9 assign an intake, and then we would also
10 potentially look at the mobile in vivo data to
11 confirm that we haven't assigned too much
12 uranium intakes. So we might use the mobile
13 in vivo data to refine our intake estimate.

14 For a best estimate, that would be the
15 number of best estimate claims we have
16 completed for Fernald is very low. I don't
17 have a specific number or percentage of these
18 claims, but I would say it's certainly less
19 than five percent of the claims. But it's
20 those cases where every piece of data for that
21 claim is considered very detailed, very
22 thoroughly, and in those cases we still are
23 claimant favorable in our assumptions for
24 those best estimates.

25 **DR. ZIEMER:** Well, if you had case where the

1 urine data, say it's a lung cancer case. The
2 urine data gave you one value for lung dose
3 and the whole body or lung counter data gave
4 you a different value. I'm assuming you would
5 use the highest values.

6 **MR. ROLFES:** Well, if it's an underestimate,
7 we would actually use the lowest value and
8 that would result in compensation.

9 **DR. ZIEMER:** Whichever way you're going.
10 You would use the value that was necessary for
11 you to make the correct --

12 **MR. ROLFES:** The one -- if it's a non-
13 compensable claim -- yes, exactly.

14 **DR. ZIEMER:** I think this rose in the
15 context of the finding. The finding had to do
16 with whether or not you could depend on this
17 type of urinalysis data, and --

18 **MR. GRIFFON:** So this was a kind of reality
19 check. I think --

20 **DR. ZIEMER:** -- the question was --

21 **MR. GRIFFON:** -- we need to know enough in
22 these selective cases because we need to know
23 enough to understand what types of uranium --

24 **DR. ZIEMER:** Could you still make the right
25 decision. I think it was in that context.

1 You weren't way out in left field with the
2 urine analysis that you wouldn't end up with a
3 completely different answer than if you had
4 lung data.

5 **DR. BEHLING:** I asked that question earlier
6 in the day. What do you do when you have two
7 sets of data, one urine, one lung count? And
8 which one dominates the decision to use for
9 settling a claim?

10 **MR. SHARFI:** The sample DR we did six and a
11 half percent does look at a situation where
12 you do have both urine and it might be once
13 you look at that you can decide if you have
14 additional questions and try to debate it
15 right here. We have now provided an example
16 where we did do an assessment of a scenario
17 where we had both urine and chest count data
18 and the case with a low [^]. And you can look
19 at, we do look at a best estimate scenario
20 versus an overestimate scenario, just the
21 urine versus --

22 **MR. GRIFFON:** Yeah, we could probably start
23 with that one. I mean, the idea of selective
24 was that we --

25 **DR. ZIEMER:** But I think the point is if you

1 looked at a number though, and you found out
2 that the urine analysis always gave you a
3 different answer than the lung, that would be
4 very troubling. Right?

5 **MR. SHARFI:** It depends on what you're
6 always assuming. If I'm always assuming Type
7 S, then that might be the case. But it's hard
8 to say because every intake scenario you can,
9 if you look at both sets of data, there are a
10 lot of cases and ways that you can refine your
11 adjustment scenario to actually fit both sets
12 of data.

13 **DR. ZIEMER:** But the context of the issue is
14 can you use the urinalysis data to reach the
15 correct decision? That's the context. And
16 insofar as you can independently, say I can
17 still get the correct decision because I have
18 these other cases where if I'd have made the
19 decision based on the lung data, I'd have come
20 out with the same decision.

21 That's why I'm saying if they were
22 always in the opposite direction, that would
23 be very troubling. You can think of some
24 weird scenario where they might be, but in
25 general, if you're making the right decision

1 with the urine data, then, because it's an
2 issue of the reliability, the urine data
3 that's in question in the finding.

4 **DR. BEHLING:** But let me pose a question to
5 Mutty again here, and that is I keep hearing
6 that the issue of claimant favorability
7 usually involves taking something that is most
8 claimant favorable in a dose reconstruction.
9 But I think sometimes there's a caveat thrown
10 in there. And when we, for instance, as you
11 mentioned earlier this morning, the issue of
12 solubility class, the statement was we will
13 always go to that solubility which favors the
14 potential dose to that particular organ of
15 interest. And is that something that will be
16 used across the board, or is that something
17 that again is only used in instances where you
18 tend to overestimate and the claim you know up
19 front?

20 **MR. SHARFI:** You're always looking for the
21 most claimant favorable scenario that fits the
22 available data. So in case you only had
23 urine, you might assume that a very insoluble
24 material that if they had had lung counts
25 would grossly overestimate them. But because

1 you don't, you might then still, even as your
2 best estimate, start to get a little more
3 insoluble material.

4 **DR. BEHLING:** And let me refocus the
5 question. Is it influenced by whether or not
6 the claimant's going to be compensated or not?
7 For instance, where you have different
8 criteria for, let's say in selecting a
9 bioassay date and if it's a routine bioassay,
10 you don't know when the intake is.

11 There are many approaches that have
12 been used in dose reconstruction that I've
13 experienced in auditing them, and that some
14 say, oh, well, that, even though it's a
15 routine bioassay, that exposure must have
16 taken place a day or two before the bioassay.
17 The other alternative is to use a mid-point
18 between that day of assay and the previous one
19 or extremely claimant favorable, use the day
20 after the most recent one. The question of
21 which one you use is always driven by whether
22 or not you intend to compensate.

23 And so again going back to the
24 question of using always the most claimant
25 favorable solubility class may very well be

1 driven by your decision or preconceived notion
2 whether or not this is going to be a
3 compensated case or not. And my question is,
4 is the claimant favorability of selecting
5 always the solubility class that's most
6 favorable to the tissue in question use
7 independent of whether or not the claimant's
8 going to be compensated or not. That's my
9 question.

10 **MR. ELLIOTT:** Yes, the answer is yes. Of
11 course, we use our efficiency process to the
12 best of our ability to get an answer, a
13 correct answer, for the claim. We do not,
14 when we're doing best estimates, we do not
15 presuppose that a solubility class that gives
16 us a non-compensable decision is the right
17 over a solubility class that would give us a
18 compensation decision. We would take the
19 compensation decision and that solubility
20 class.

21 **DR. BEHLING:** Okay, because I've seen it in
22 other instances where when you realize, okay,
23 based on that assumption that's claimant
24 favorable, you're going to reach a 50 percent
25 or greater, then oftentimes the situation

1 changes. We go back and say, well, let's go
2 back and see where did this individual work.
3 Well, he worked in a facility that had uranium
4 tetrafluoride or uranium oxide. And the good
5 will of assuming that the most claimant
6 favorable solubility is withdrawn because
7 empirical data would allow you to do that.
8 And I'm asking that question. Is it a given
9 that --

10 **MR. ELLIOTT:** We don't have --

11 Help me out here, guys, if you will,
12 but my understanding is if we don't have data
13 otherwise, we don't have the information to
14 say here's the specific solubility class that
15 should be used, we would look at each
16 solubility class and pick the one that is most
17 claimant favorable.

18 **DR. BEHLING:** There is a back door, and
19 that's what I'm saying is that --

20 **DR. ZIEMER:** If you don't have the
21 information.

22 **DR. BEHLING:** -- in a case of, let's say I'm
23 reviewing the Portsmouth. And there are
24 individual locations in Portsmouth where all
25 the radionuclides are listed, and there is a

1 segregation based on what the best estimate is
2 regarding the solubility class. And you would
3 not necessarily default to one that is most
4 claimant favorable if the empirical data would
5 suggest that there's a solubility that is
6 perhaps less favorable in those instances.

7 And I guess I just want to separate so
8 that when we see an audit that involves a real
9 case, and the assumption, the default
10 assumption, of the most claimant favorable
11 solubility class does not exist I understand
12 why. Because there's empirical data to
13 justify selecting another solubility that will
14 reduce the dose.

15 **MR. ELLIOTT:** And I would expect that to be
16 articulated in the report.

17 **MR. GRIFFON:** And that's what Jim Neton
18 would call sharpening the pencil. So we've
19 seen that.

20 **MR. ROLFES:** And this leads to considering
21 all pieces of scientific data that are
22 associated with the claim.

23 **MR. GRIFFON:** Well, I'm leaving number four
24 as in progress because I think we might want
25 to see a couple of these in addition to the

1 one you've already provided, Mutty, if that's
2 okay. I think let's just leave that in
3 progress, get a couple more of those pieces.
4 And I say selected cases because I want you to
5 select cases where you know, because I agree,
6 you're not sure. If it's an unknown
7 solubility case, you want to pick the case
8 that you know --

9 **MR. MORRIS:** So you want two more example
10 dose reconstructions or two more just
11 comparisons of datasets?

12 **MR. GRIFFON:** Two more just comparisons of
13 datasets I think, a couple more comparisons of
14 datasets.

15 **MR. SHARFI:** Just for clarification. How do
16 you want us to, when we take comparing data
17 without doing a dose reconstruction, I don't
18 know how you compare the data.

19 **MR. GRIFFON:** Well, you do have to compare
20 the internal dose. I'm not asking for a full
21 DR.

22 **MR. SHARFI:** Oh, and you're talking about
23 just the assessment of the bioassay.

24 **MR. GRIFFON:** Of the bioassay, right,
25 bioassay and lung, selecting a case that you

1 have enough knowledge of what types of
2 material they were working with I guess would
3 be the way I'd narrow it.

4 **MR. PRESLEY:** We talking about one case?
5 How many cases are we talking about doing it
6 to?

7 **DR. ZIEMER:** Sounds like two or three,
8 right?

9 **MR. GRIFFON:** Right, a couple or three,
10 yeah.

11 **MR. CHEW:** We actually want the thought
12 processes, the logic.

13 **MR. GRIFFON:** Right, that's what you want,
14 right, just to demonstrate that logic.

15 **DR. ZIEMER:** And then we're trying to
16 demonstrate that the urine analysis is a valid
17 piece of data to use or set of data to use.

18 **MR. GRIFFON:** Yeah, remember, it comes from
19 the finding of a concern over the urinalysis
20 data in general, so we're trying to show these
21 cases should demonstrate that --

22 **DR. ZIEMER:** In fact, you want a case where
23 you know something about what its form was,
24 not one that --

25 **MR. GRIFFON:** We don't want an ambiguous one

1 because then we'll get an ambiguous result.

2 **MR. CLAWSON:** And also in the same sense
3 we're evaluating the lung count, too, though,
4 aren't we?

5 **DR. ZIEMER:** Yeah, but the point is do you
6 get correct body burden or the correct organ
7 burden by both methods. That would serve to
8 validate the issue of the urine data being
9 reliable.

10 **MR. GRIFFON:** Yeah, but I think Brad's
11 right. If you, at the other end of the
12 spectrum if you have some things that are
13 totally out of whack, then you say one or one
14 or the other is wrong.

15 **DR. ZIEMER:** But the point is you're using
16 urine analysis and showing it's --

17 **MR. ROLFES:** I think we've already completed
18 this request with our sample dose
19 reconstruction 14, internal 14, because we
20 did, in fact, compare urinalysis data. We
21 estimated the intakes based on urinalysis data
22 then compared the projected intakes to the
23 actual measured mobile in vivo results. So I
24 think that it's already been completed. So I
25 think it would be important for the Advisory

1 Board to review what we have --

2 DR. ZIEMER: Where is that?

3 MR. ROLFES: That's internal number 14
4 that's made available on the O drive. And
5 this was also the same sample dose
6 reconstruction that considered potential
7 exposures and Hallam reactor elements.

8 MR. GRIFFON: Then I think as an action we
9 should have SC&A review that DR, internal 14.
10 So in progress was not, we'll delete in
11 progress, right?

12 MR. ROLFES: Well, I guess I would ask that
13 you take a look at that first, and then if
14 we'd like to do some more specific things,
15 we'd be happy to. We don't want to repeat
16 something that we've already done.

17 MR. CLAWSON: Mark, what was the name of
18 that again because I'm looking at that.

19 MR. ROLFES: The sample dose reconstruction
20 was internal number 14.

21 DR. ZIEMER: That's the name of the file?

22 MR. ROLFES: That's correct. It's under the
23 sample dose reconstruction folder. I believe
24 the folder's actually titled working drafts of
25 Fernald sample --

1 **DR. ZIEMER:** I got it.

2 **MR. CLAWSON:** Let's take a short break real
3 quick.

4 (Whereupon, the working group took a break
5 from 2:43 p.m. until 2:55 p.m.)

6 **DR. ZIEMER:** I just wanted to mention I've
7 reviewed this case during the break which is
8 the determination of POCs from the urine data
9 and from the chest count data. This was done
10 for colon, kidney, lung and prostate based on
11 cancers in a real case, although they've
12 modified a few things so we couldn't identify
13 the person. But the compensation decisions
14 would have been the same for both methods in
15 this case. The lung burden --

16 **MR. GRIFFON:** This is a dose reconstruction.

17 **DR. ZIEMER:** A dose reconstruction, the
18 example.

19 **MR. GRIFFON:** Right.

20 **DR. ZIEMER:** Well, it's all right. It's all
21 right. I mean ultimately the question still
22 is, okay, we can argue that whole Labor thing
23 but it comes down to that. They calculated
24 the doses to the lung. But the interesting
25 thing is the lung values came out 92 percent

1 and 99 percent for the two methods.

2 **DR. BEHLING:** Can you tell us which one's
3 higher?

4 **DR. ZIEMER:** The urine data gave a slightly
5 higher value.

6 **DR. BEHLING:** To the lung?

7 **DR. ZIEMER:** To the lung. Well, actually,
8 for everything. The ones that were the
9 furthest apart that didn't affect the
10 compensation decision was kidney. The urine
11 data gave it at 44 percent. The lung data
12 only at 21 percent, but any --

13 **MR. RICH:** Well, wouldn't you expect that
14 because of the configuration of the counter
15 itself. It was intended to be a --

16 **DR. ZIEMER:** Intended to be a chest counter,
17 but presumably from the body burden you can
18 still in modeling you can estimate organ dose.

19 **MR. RICH:** But only to have an estimate that
20 ten to 20 percent ^.

21 **DR. ZIEMER:** In any event I'm kind of
22 satisfied that they've done what we've asked.
23 I'm not sure what we'll gain by doing a couple
24 more cases.

25 **MR. GRIFFON:** I think we've conceded that.

1 We said we'd look at this on first, right?

2 **MR. ROLFES:** There are other examples
3 internal dose reconstruction, like the default
4 two percent enrichment that we're using as
5 well. So within a comparisons of the
6 probability of causation for a selection of
7 organs. So once again if you'd like to take a
8 look at that, and if you have any additional
9 questions or clarifications, then we can
10 proceed.

11 **MR. ELLIOTT:** Brad, I'd like to say
12 something for the record here. I really
13 applaud Mark's efforts at trying to keep this
14 working group informed of things that we have
15 developed in response. I know that the
16 working group Board members have had a lot on
17 their plate in the last couple of weeks with
18 the Board meeting and all of that. And I
19 guess I just feel I need to say this because
20 it's somewhat apparent to me that you all
21 haven't had a chance to avail yourselves of
22 the examples that we've given and some of the
23 other answers and responses that we tried to
24 put on the O drive for you. Is there
25 something that we could do better in that

1 regard? I know you're all busy. I know you
2 all have got a lot of things going on
3 especially with the Board meeting the week
4 before last, but if you think of things that,
5 you know, I know that Mark was very diligent
6 in sending out his e-mails and reiterating
7 what he's already said before in previous,
8 what he'd given up before he identified again,
9 and what was new being added he identified for
10 you. So if you think of things that we can do
11 to improve in that just so that we can alert
12 you that there is information for your benefit
13 before you come to a meeting, if you can check
14 it out that's great. If not, you might --

15 **DR. ZIEMER:** No, I agree that Mark is very
16 diligent, and I think one of the real
17 limitations is the volume of stuff that comes
18 to us and trying to digest it all.

19 **MR. GRIFFON:** And it's not only for Fernald
20 obviously.

21 **DR. ZIEMER:** No, I mean, it's Fernald, and
22 it's Hanford, and --

23 **MR. ROLFES:** Multiple sites, there's a lot
24 on everyone's plate here.

25 **DR. WADE:** And that's why it's so valuable

1 for the work group meetings because as Mark
2 was telling you earlier to touch everything
3 when you come here so you can know what's out
4 there and know if there are other things that
5 you need. You just need to keep working.

6 **DR. MAKHIJANI:** Mark, was there any review
7 item in here for us other than 14 which you
8 assigned earlier?

9 **MR. GRIFFON:** Just to review DR number
10 internal 14. We're not going to do any
11 additional ones unless we have some questions,
12 unless that raises questions I guess, but that
13 probably will satisfy our request.

14 **DR. MAKHIJANI:** So overall or not any radon
15 breath things or --

16 **MR. GRIFFON:** We haven't gotten to the radon
17 breath. That's another issue in Finding 3.

18 **MR. ELLIOTT:** Still trying to get us ahead
19 here.

20 **MR. GRIFFON:** Call us back at ten p.m.
21 tonight.

22 **MR. CLAWSON:** But if I would ask, Mark, when
23 we get done with this today, there's just a
24 couple on this internal 14 that I want to go
25 over with you. It's just to try to help me

1 figure out --

2 **MR. ROLFES:** Sure, certainly.

3 **MR. CLAWSON:** -- and we'll go from there.
4 And I'll just get with you after we go. I
5 need to call you. It's just some questions
6 that I was trying to figure out what --

7 **MR. ROLFES:** Certainly, please, I'm always
8 available.

9 **MR. CLAWSON:** My boss doesn't seem to think
10 I'm not very available.

11 Anyway, let's go back to the matrix.

12 **FINDING 4.1-3**

13 **DR. BEHLING:** This one, I think, is one that
14 we are likely to discuss in context with the
15 cohort dose models. The finding that was
16 identified as Finding 4.1-3, the failure to
17 monitor all personnel with potential internal
18 exposure to uranium, was triggered by a
19 document that was part of the petition that
20 Sandra submitted wherein you'll see the actual
21 exhibit or attachment on page 29 of my report
22 that identified a total of four workers who
23 had, in words of the document, had unexpected
24 urinary excretion rates that were
25 unexplainable especially for case number

1 [identifying information redacted]. That this
2 individual had an excretion volume in excess
3 of -- I won't give you exact numbers -- in
4 excess of five milligrams per liter. And the
5 statement was --

6 **MR. ROLFES:** That's inaccurate. I believe
7 that should be maybe 500 micrograms or --

8 **DR. BEHLING:** I'm sorry, it's 0.5, and
9 that's all. I'm going to give it just one
10 number, 0.5 milligrams. I'm sorry if I said
11 500, but that's a significant number when you
12 view it in context with 0.025 and 0.04 action
13 lines. People would be followed up, in fact,
14 as I've stated in my write up, you know, this
15 unexpected value is 13 times higher the value
16 of 0.04 milligrams per liter action level.
17 And I guess if this was a chemical operator, I
18 would say, well, okay, that speaks to have a
19 high value, but what was surprising here is
20 that this case was regarded as an exposure
21 that wasn't expected.

22 And the question is why wasn't it, and
23 who were these four people who were monitored?
24 And I think it's part of the things that you
25 submitted on the O drive. I did come across

1 something that may explain it. I don't know.
2 But I looked at a whole bunch of records where
3 the document was termed breakdown of personnel
4 by control group.

5 Now I don't know, and there's a
6 heading called control group. Now I'm looking
7 at that and wondering if these people were
8 selected as baseline values or what the term
9 control group is in reference to. Were these
10 people who were selected from worker
11 population groups that weren't expected to
12 have any exposure? And were nevertheless
13 monitored for whatever reasons?

14 And I think we were asking you if you
15 could identify these four individuals and
16 somehow specify what was the justification for
17 monitoring them.

18 **MR. ROLFES:** We did look into HIS-20 data.
19 We identified the four individuals. These
20 high results are, in fact, in HIS-20. I
21 believe these four high results are all the
22 first results for each of these individuals in
23 the record of HIS-20. So we've identified
24 them. One of the four, in fact, had a follow-
25 up within the month, yet there's three did not

1 have follow ups. So we've identified the
2 individuals, and we have this investigation
3 report that basically was asking us, you know,
4 what potentially happened to these individuals
5 for them to have a high urinalysis result.

6 This is also during the time that it
7 is very possible because of where urine sample
8 bottles were stored in the earlier time
9 periods, it's very possible that these urine
10 sample bottles could have been contaminated
11 with processed material, uranium. So these
12 would, the measured concentrations of uranium
13 in urine based on cross-contamination would
14 essentially result in a higher dose estimate
15 for these individuals than what was actually
16 received.

17 **MR. GRIFFON:** Do you have, I know you
18 provided a write up for this. Do you know
19 what the document name is?

20 **MR. ROLFES:** It's an Excel spreadsheet. I
21 believe it's reference 29-13.

22 **MR. GRIFFON:** Okay, I've got it.

23 **DR. BEHLING:** This is a question that I
24 have, and I'm not sure you answered it just
25 now. But why were these people monitored?

1 Was it standard protocol to take people who
2 were not expected to have any exposure to
3 uranium, nevertheless subjected to urinalysis
4 that in this case surprisingly showed up with
5 high values?

6 **MR. ROLFES:** Everyone gave a urinalysis
7 sample, and by everyone I say, you know, the
8 great majority of individuals, more than 93
9 percent of individuals at least gave one
10 annual sample at Fernald. So this was not the
11 only urine sample that these individuals
12 provided. So if you take a look at their
13 records within the analysis that NIOSH made
14 available to the Advisory Board, it indicates
15 that there are additional urine samples in the
16 subsequent years after this.

17 **DR. BEHLING:** And I think my concern in
18 writing up this issue as a finding comes in
19 concert with Arjun's concern about fugitive
20 missions that may have exposed people who were
21 certainly not candidates for an internal
22 exposure. And so that's the reason why this
23 issue was raised. But if you say that people
24 were as a matter of fact monitored at least
25 once a year, that would certainly perhaps

1 provide us with some insight as to people's
2 exposure that at least were monitored on some
3 routine basis and not ignored so that you
4 don't have people for whom there's no
5 monitoring data. And then you're sort of
6 stuck with what do we do for these people if
7 they're claimants.

8 **MR. ROLFES:** We spoke with an industrial
9 hygienist regarding these fugitive emissions,
10 and he indicated that if you expected that a
11 person was not going to be exposed, if you
12 looked at the entire dataset that the dataset
13 would be indicative that these personnel were
14 not exposed personnel.

15 These are unusual occurrences, and
16 because it was an unusual occurrence because
17 this bioassay data was elevated, they did, in
18 fact, investigate it as indicated by this
19 report that was provided. So once again,
20 those urinalysis data would be used in a dose
21 reconstruction as is for estimating a person's
22 intake.

23 **DR. BEHLING:** Now the issue of the coworker
24 data model, can you elaborate as to who they
25 may apply to?

1 **MR. ROLFES:** The coworker data model would
2 be, well, I guess I'll let Bob Morris speak to
3 that a little bit more about the application
4 of uranium intakes to unmonitored personnel.

5 **MR. MORRIS:** I understand we've got on the
6 order of ten dose reconstructions that are
7 pending coworker study completion. So the
8 great majority of dose reconstructions at
9 Fernald do not depend on coworker models.
10 We've got a few waiting for a signature on
11 this report that's coming out soon.

12 **MR. SHARFI:** Actually, internal I think
13 there's only about one or two. For the
14 coworker in general if you include external,
15 there's about ten or fifteen. But the
16 internal there are only I think one or two,
17 and these are usually subcontractors who
18 worked there like three months ^ and then
19 that's the limit of their exposure. They were
20 very short periods of time, usually not prime.
21 They fall into the construction trade worker
22 category.

23 **MR. GRIFFON:** Does it include D&D era?

24 **MR. MORRIS:** The coworker model?

25 **MR. GRIFFON:** Yeah.

1 **MR. MORRIS:** Yes.

2 **MR. GRIFFON:** Well, I mean, does your
3 assessment of one person for internal include
4 after the D&D era?

5 **MR. MORRIS:** All that's outstanding.

6 **MR. SHARFI:** Active claimants.

7 **MR. GRIFFON:** Because I know I'm just
8 reflecting back on Rocky and in that case
9 though the coworker model was truncated before
10 the D&D period. So I think you have it all
11 laid out, right?

12 **MR. ROLFES:** Does that answer your question?

13 **MR. GRIFFON:** Yes.

14 **DR. BEHLING:** Do you have anything?

15 **MR. GRIFFON:** Only a follow up on this
16 spreadsheet. I guess the question I have was
17 if these were investigated. And I'm assuming
18 that all the values are in there, but there's
19 one individual that the follow-up sample has
20 been 13 months later?

21 **DR. ZIEMER:** More than that.

22 **MR. ROLFES:** Only one of the four gave a
23 follow-up sample within the first month.

24 **DR. ZIEMER:** I thought that was very
25 strange.

1 **MR. GRIFFON:** And all of them are their
2 first urine sample that they ever had.

3 **DR. BEHLING:** And they exceeded the 0.04
4 milligrams value which should have triggered
5 something else --

6 **MR. ROLFES:** Which triggered --

7 **DR. BEHLING:** -- you're coming down again.

8 **DR. ZIEMER:** This one has a gap from
9 February '66 to December '67 for the next
10 follow up. And that seems awfully strange
11 after an incident. I mean I don't know if we
12 can speak to that, but it just looks strange.

13 **MR. ROLFES:** If we take a look at the code
14 associated with the urinalysis result, that
15 might give us a better indicator of why the
16 sample was collected. If it was for an annual
17 physical, if it was for an annual physical, if
18 there wasn't a follow up, there may be
19 additional documentation which we haven't
20 located at this time.

21 **DR. ZIEMER:** Well, there's three here that
22 are part of the incident, then this lapse of
23 18, actually 22 months before the annual
24 physical which is -- anyway his annual samples
25 are two years apart.

1 **MR. GRIFFON:** What did the investigation
2 conclude? Did the investigation find
3 anything, any problems?

4 **MR. ROLFES:** The investigation --

5 **MR. GRIFFON:** The report?

6 **DR. BEHLING:** I didn't follow it through
7 because I had not looked at what you ended up
8 doing on behalf of these four individuals that
9 are cited in this memo. So I am not sure I
10 know what the outcome of the investigations,
11 but as Paul just mentioned, there are some
12 inconsistencies here. Because I quoted in my
13 statement that 0.025 milligram and 0.04
14 milligram are two action levels that should
15 have triggered a subsequent urinalysis as a
16 minimum for all four of them.

17 I mean, one of them exceeded by a
18 factor of 13. The other one exceeded by a
19 factor of ten the higher action item. And you
20 sort of say again going back to the issue, did
21 the people take the urinalysis all that
22 seriously?

23 **MR. ROLFES:** Well, I see what you're saying.
24 In this case it does indicate that there was
25 an investigation. You know, it's clearly

1 documented that this individual was working in
2 this area, and they discussed, it appears in
3 this document, that they were discussing the
4 individual's work history. Where were they?
5 What was being done?

6 There may be other documents
7 associated with this that we haven't located
8 to date. That's very possible. But if as a
9 result of this investigation they determined
10 that these results were false positives for
11 cross-contaminated samples, it may be that
12 they didn't request a follow-up bioassay
13 because they had made the determination that
14 the individual had not entered a
15 radiologically controlled area.

16 **DR. BEHLING:** Well, it seems like from the
17 document -- I'm looking at the document in
18 question here that's identified as Attachment
19 4.1-3 on page 29 of the report. And the
20 statement is the investigation failed to show
21 why these urinalysis samples were high in
22 uranium, meaning that they had conducted the
23 investigation and they never understood why.
24 There was no reference here to a contamination
25 of laboratory or anything else. It was just

1 an unanswered question.

2 **MR. MORRIS:** I recall that we discussed this
3 with an informed person during one of our
4 interviews. And he said that they stored
5 sample bottles at that time co-located with
6 their laboratory which was in an operating
7 facility. And that they were never surprised
8 when they got elevated contamination on these
9 cross-contaminations because of the way they
10 were stored.

11 His point was that for this group of
12 people that were normally never exposed to the
13 plant conditions but were in the
14 administrative buildings that we needed to
15 look at that in the context of that small
16 coworker population of administrative workers.
17 And he said you look at them as a group, and
18 you'll never see evidence that there was a
19 large exposure in a building, in an
20 administrative building. There was not a
21 cloud wafting into the building from a
22 processing facility.

23 **MR. GRIFFON:** The investigation at the time
24 it was inconclusive.

25 **MR. MORRIS:** I can't talk to the specifics

1 of that. All he said was we would never be
2 surprised at a cross-contamination of a sample
3 bottle.

4 **DR. MAKHIJANI:** I think that would have been
5 written down.

6 **DR. BEHLING:** Yeah, I would have expected
7 them to at least suggest that as the
8 explanation.

9 **MR. RICH:** The wording on the memo would
10 imply we couldn't find the source or any
11 reason why the individual, in other words,
12 they had gone through the full process of
13 defining where he was, and where he worked.
14 And they couldn't, the language -- at least I
15 would interpret it saying we simply could not
16 identify any source of contamination.

17 **DR. BEHLING:** That's not what it says. It
18 says we don't, the investigation failed to
19 show why these urinary samples were high in
20 uranium.

21 **MR. RICH:** That's exactly what I'm saying.

22 **DR. BEHLING:** No, that doesn't talk about
23 source term. It talks about why. If, for
24 instance, cross-contamination would have been
25 one of the options, they should have maybe

1 made reference to that.

2 **MR. MORRIS:** I doubt that we're going to get
3 any more data on this. This stands as the end
4 of the track for this string as we've pulled
5 it.

6 **DR. ZIEMER:** Well, if these individuals had
7 a claim at this point, you would assume that
8 that was a real exposure. Is that correct?

9 **MR. ROLFES:** Certainly.

10 **DR. ZIEMER:** So under the rules they would
11 get assigned dose and so --

12 **DR. BEHLING:** But Paul that was not, the
13 question, I mean other people were exposed but
14 were never monitored. Was this --

15 **DR. ZIEMER:** The issue is failure to
16 monitor.

17 **DR. BEHLING:** Yeah, well, was this a
18 serendipitous finding or were you looking for
19 a baseline and you found fairly high excretion
20 rates. And if that's the case, how many other
21 people who were not monitored might have also
22 had high excretion rates; and therefore, their
23 data are never part of the record?

24 **MR. MORRIS:** I think that's what this ^
25 exactly told us. He said to look at the whole

1 body of administrative workers. As a group
2 you will find that they have a routine annual
3 physical bioassay system imposed on them. And
4 that in that group of people you'll find
5 diminishingly small numbers for their sample
6 results as a whole.

7 **DR. BEHLING:** But disturbing is what Paul
8 just said that when followed up, some of these
9 people weren't monitored again for 22 months,
10 and they should have been monitored within the
11 next few days and weeks.

12 **MR. SHARFI:** But that only leads to a larger
13 dose assigned when you have a follow up that's
14 so far out, you basically result and all that
15 you can do is a very large one.

16 **DR. ZIEMER:** So it gives a bigger dose.

17 **MR. GRIFFON:** It's part of the quality of
18 the program.

19 **DR. ZIEMER:** I understand.

20 **DR. BEHLING:** I mean, in one of their
21 statements, Paul, it says that when there's
22 levels of 0.04 micrograms per liter that you
23 do a follow up. And here you have 13 times
24 that volume with no follow up. And yet no
25 explanation was given that says, well, this

1 was all an artifact; and therefore, there's no
2 need for a follow up. If that had been in the
3 record, I'd say well, they looked at it,
4 there's a justification for no follow up, and
5 no need to concern yourself. But that
6 document does not give you that warm feeling.

7 **MR. ROLFES:** I'd like to ask for a
8 clarification. You said a follow up was
9 conducted after 0.004 milligrams per liter?

10 **DR. BEHLING:** That was the criteria for
11 action.

12 **MR. ROLFES:** That was 40 micrograms per
13 liter.

14 **DR. BEHLING:** Well, 40 micrograms is 0.04
15 milligrams.

16 **MR. ROLFES:** Zero point zero four, yes,
17 correct. I thought you said 004. I
18 apologize.

19 **DR. MAKHIJANI:** Hans mentioned it in
20 passing, but I think this is a more than
21 passing problem at Fernald. There are very
22 clear documents that show the importance of
23 fugitive emissions and unmeasured emissions to
24 the atmosphere. They're well documented in
25 many cases and there are also documents that

1 show that the losses that were not measured
2 were often bigger than the losses that were
3 measured.

4 And the thorium memo that's cited in
5 the site profile review that we gained that
6 uranium conditions were the same, and I think
7 that a possible explanation certainly -- I
8 don't know more than what these folks wrote,
9 but I do know that at that time they weren't
10 looking very carefully at the contamination of
11 the general air in the plant around the
12 working building. And it's quite possible
13 that somebody might be perpetuated with going
14 at lunchtime from one building to another to
15 meet somebody.

16 And they might get exposed to quite
17 significant amounts of uranium that had
18 nothing to do with stack emissions which is
19 how environmental doses have been approached.
20 I think at Fernald from whatever I've seen of
21 the data, the stack emissions would be not the
22 most important part of the onsite
23 environmental dose. There would be fugitive
24 emissions. I don't have a very good handle on
25 that.

1 **MR. CLAWSON:** ^ bring up in that though
2 where we had administrative people in there,
3 and they were getting a tremendous amount just
4 from the paperwork that was coming back from
5 going across the road.

6 **MR. ROLFES:** It would have been difficult to
7 compare a plutonium facility --

8 **DR. MAKHIJANI:** ^ highly enriched uranium.

9 **MR. ROLFES:** -- yes, and a highly enriched
10 uranium as well. To address what this
11 discussion, we had this discussion at the last
12 Advisory Board working group meeting, and
13 NIOSH consulted with a former industrial
14 hygienist that had worked at Fernald. And we
15 asked his opinion on what the conditions
16 outside of the operating plants were. And he
17 indicated that this was absolutely not routine
18 at Fernald. He indicated that outside of the
19 buildings was certainly much safer than
20 inside.

21 **DR. MAKHIJANI:** Well, you know, I think it's
22 all well and good to consult people who worked
23 there, and we all do it routinely and document
24 it. But you do have to compare that to the
25 documentation from the time. You have

1 documentation before you that thorium was
2 being dried in open doorways and that was
3 blowing liberally about. We supplied you that
4 documentation. You have it. I believe it
5 might even been in the petition. And that
6 you're dealing with air concentrations that
7 are dozens or hundreds of times of MAC. I
8 don't remember the exact numbers, but I can
9 dig them up for you. So I'm not bringing this
10 up lightly. I think this is a point that has
11 to be technically addressed by trying to
12 estimate fugitive emission doses based on
13 documentation that you already have about
14 fugitive emissions that were measured at the
15 time. I don't see how fugitive emissions that
16 were measured at the time and numbers were put
17 down on paper can be ignored in favor of
18 somebody saying that the outside air was
19 pretty clean, trust me. I can't see the logic
20 of that response.

21 **MR. MORRIS:** We have in one of the
22 interviews that you'll be soon getting an
23 interview with a person who was in a position
24 of authority and knowledge of this time. And
25 Bryce was interviewing them. And he said a

1 secretary who never got into a production area
2 who had a high result in an annual physical,
3 that's an indication to the lab that the lab
4 was in a uranium production facility. Bottles
5 were stored there prior to being sent to
6 Medical. We fully expected occasional bottle
7 contamination. I don't think anyone ever
8 assumed it was anything but a contaminated
9 sample. Bryce says the conclusion being drawn
10 by reviewers is that this indicated high
11 fugitive dusts in the plant area, and a lot of
12 people were routinely exposed and not
13 routinely monitored. He says go to IH air
14 monitoring reports, 1950s ending in 1968.
15 There are many results listed for walkway,
16 roads and offices in the production areas.
17 You get a very good picture on if there were
18 any of these spooky high air dust clouds
19 floating and zapping some secretary. To get a
20 secretary they would have gotten everyone in
21 the area, and there was no plant where that
22 occurred. The data for these areas is what
23 you would expect. Nothing that would be
24 considered high.

25 **MR. ROLFES:** Thank you, Bob.

1 **MR. SCHOFIELD:** I don't think you can rule
2 out the fact that somebody tracked
3 contamination into a building or into an
4 office. It happens at every facility.

5 **MR. ROLFES:** Certainly, of course it does,
6 or not at all. But we are simply
7 demonstrating that the airborne concentrations
8 inside of the production facilities or
9 associated with that production are much
10 greater than the fugitive dust emissions that
11 are, you know, the uncertainty is being cast
12 on these fugitive emissions which are not a
13 significant potential exposure source term for
14 individuals at the site.

15 **MR. GRIFFON:** I'm back more to this narrow
16 issue than the broad question. I mean, the
17 issue to me that this raises here is there any
18 more of this investigation that we can find?
19 If not, it raises more questions in my mind
20 about the quality of the program.

21 I mean, here's a case where you have
22 an investigation report, and yet you can't
23 find follow ups that they say, you know, so
24 the question, we had before about procedures
25 from the '50s through '80s, which we still

1 don't have any of in QA reports for that
2 period, is heightened for me now, I guess.
3 Because you're looking at a case right here
4 where you say these are baselines.

5 If I had these people coming in to
6 work here, and this is actually a, I don't
7 know if it's a baseline because I don't know
8 when the hire date was. But if it was a
9 baseline, I'd want to know where the heck they
10 worked before or if they, you know, and if it
11 was an annual, certainly I would have done a
12 follow up sooner than 22 months based on these
13 initial levels.

14 So back to Hans' point. What's the,
15 how well can we trust this urinalysis data,
16 and what was the quality for that early time
17 period? I guess that's what it raises in my
18 mind.

19 **MR. ROLFES:** I apologize. I'm just looking
20 through my notes, and I'm trying to recover --

21 **MR. GRIFFON:** Sandra has a comment.

22 **MS. BALDRIDGE:** They really weren't required
23 to monitor ^ people on an annual basis. A lot
24 depended on where they worked. And if the
25 plant had determined in their mind that the

1 exposure potential was low. So those areas,
2 they weren't required to monitor.

3 **MR. GRIFFON:** Well, I guess my point is
4 here's four people, they probably anticipated
5 being low. And they had elevated samples.
6 They investigated it, but they didn't do
7 follow up to see if it was a real or if it was
8 a contaminated bottle. Or at least the data
9 we have doesn't indicate that they followed
10 up. Maybe, the only other question is, this
11 is from HIS-20, this data. Maybe specials
12 were not included in HIS-20. Maybe there were
13 follow ups that were done that aren't even
14 part of the dataset in HIS-20. I don't know.
15 But it certainly raises that question in my
16 mind.

17 **MR. MORRIS:** We do have a one-month follow
18 up for one of the four.

19 **MR. GRIFFON:** Yeah, that's right, so one of
20 them had, yeah. One of them was followed up.

21 **DR. BEHLING:** Of the four, which one was it?

22 **MR. GRIFFON:** But you can't say the name.

23 **DR. BEHLING:** No, I'm just saying they're
24 numbered one through four there, and the names
25 have been deleted.

1 **MR. SHARFI:** Number three.

2 **DR. BEHLING:** Number three?

3 **MR. GRIFFON:** Right.

4 **DR. BEHLING:** That was also the highest one.

5 **MR. GRIFFON:** And the follow up was
6 elevated, so then that would make me, if they
7 just did it because it was the highest I think
8 if I saw an elevated sample, I'd say, oh, I
9 better follow up on the other people, too.

10 **DR. MAKHIJANI:** If the follow-up sample was
11 elevated, that would discount the explanation
12 that --

13 **DR. BEHLING:** Yes.

14 **DR. MAKHIJANI:** -- this was a cross-
15 contamination.

16 **MR. ROLFES:** Or if you take a look at the
17 case history, it's possible that this
18 individual worked at another site prior to
19 coming to Fernald as well.

20 **MR. SHARFI:** Also, on the report number
21 three is the only person they say there's a
22 possible almost exposure potential. The rest
23 of them they say it's unlikely given their
24 work scenario that they, that they would
25 result in a dose or an intake that would

1 result in this bioassay. Number three they do
2 say that there is a possibility, and you
3 might, one of the reasons why --

4 **MR. GRIFFON:** Is this for a Fernald exposure
5 or for previous --

6 **MR. SHARFI:** They worked in the radio
7 chemistry lab. So that might be the reason
8 why that person actually did a follow up;
9 whereas, the rest of them their job title and
10 work location didn't indicate a potential so
11 they saw no need. And once again we've talked
12 about the reliance on the bioassay from the
13 sense of back then. They look at the bioassay
14 more as because the modeling situation wasn't
15 as reliable.

16 So they might have focused more on the
17 field indicators saying that these three
18 people, three of the people didn't really have
19 potential; whereas, the one person had
20 potential. So let's go ahead and get a follow
21 up on that one person.

22 **MR. GRIFFON:** So they might have bypassed
23 their own protocols then?

24 **MR. SHARFI:** Well, I don't know all the,
25 didn't get any of the details, but they might

1 have investigated it, but decided follow-up
2 bioassay wasn't necessary for that situation.

3 **DR. BEHLING:** Well, let me read you what the
4 requirements were, and I'm quoting directly
5 from a document that the head of the Health
6 and Safety was in charge of and said urine
7 results. "Persistent results of 0.025
8 milligram per liter indicates moderate
9 exposure and results over 0.04 milligrams per
10 liter are considered due to excessive exposure
11 which require follow up."

12 **MR. SHARFI:** When was that?

13 **DR. BEHLING:** That was in April 19th, 1972.

14 **MR. SHARFI:** Yeah, that's '72. These
15 samples were in '55. So I mean, I'm not
16 saying that that follow-up procedure was ^ was
17 present during the time that these samples
18 were resulted. So I hate to draw conclusions
19 what they would mean in the '70s versus --

20 **MR. GRIFFON:** Right. I thought that was
21 protocol at the time. I didn't realize that.
22 I mean, it goes back to the question of some
23 procedures from the time.

24 **MR. SHARFI:** My understanding is that that
25 was protocol since early days of that 0.40

1 micrograms is how it was.

2 **DR. BEHLING:** Yeah, I think it was if I
3 recall, too. That was an early requirement.

4 **MR. GRIFFON:** I don't know that we're going
5 to come to any conclusion here, but I just, so
6 I guess the only follow up I would have -- and
7 it may be a dead end like you said, but if
8 there's any way to pull the string on this
9 follow up to this memo, if there's anymore
10 investigation documents.

11 **MR. MORRIS:** We'll try and revisit it and
12 see what we find.

13 **MR. GRIFFON:** And then the only other thing
14 I would maybe go back to is the previous
15 finding where we had your response number one
16 was the QA report in 1953. Your response was
17 that we found one from 1953 but nothing else,
18 but we have interviews. And I guess I'm
19 asking again, I mean, I don't know what this
20 means, but I don't know that I'd stop turning
21 over rocks. If you can find any more QA
22 reports or procedures from that time period.

23 **MR. MORRIS:** In fact, this pointer that you
24 pointed to, IH reports from that era, we
25 haven't found them yet.

1 **MR. GRIFFON:** Oh, you haven't found those.

2 **MR. ROLFES:** We do have some, but it's
3 probably not a high --

4 **MR. GRIFFON:** ^ the IH reports because they
5 may include a QA section, a ^ section.

6 **MR. MORRIS:** In fact, there's some
7 suggestion that they did.

8 **MR. ROLFES:** We do have thousands of
9 documents that are on the site research
10 database.

11 **MR. GRIFFON:** I just want to make sure that
12 I wasn't, by skipping that that I wasn't
13 saying that action was off the table. If you
14 keep looking, that's fine.

15 **MR. ROLFES:** Every time we go back and look
16 for something, we can find documents that we
17 didn't realize we had there. And so certainly
18 we've been spending a lot of time to make sure
19 that we are, in fact, providing everything of
20 relevance to the Advisory Board for our
21 discussions. They may be there, so I'd have
22 to take a look through those. And also, if we
23 realize that we don't have them, we could also
24 make a request, a supplemental request, to get
25 those.

1 **MR. GRIFFON:** That's fine. So for that I
2 just said NIOSH will do additional follow up
3 on the investigation report.

4 **MR. CLAWSON:** Okay, moving on.

5 **FINDING 4.1-4**

6 **DR. BEHLING:** Finding 4.1-4 on page 30 of
7 the report, the use of claimant unfavorable
8 assumptions and default values regarding the
9 level of uranium enrichment. I think we had
10 discussed that sufficiently, so skip that one?

11 **MR. GRIFFON:** Yep.

12 **DR. BEHLING:** Everyone's agreed.

13 **FINDING 4.1-5**

14 I'm not sure if the next one isn't
15 yours, Arjun, recycled uranium? It's Finding
16 4.1-5, and the finding states there are
17 several radionuclide contaminants in RU that
18 are not adequately considered for internal
19 dose estimates. Most relevant to this concern
20 are impacts of these contaminants in RU
21 raffinate waste streams. And I guess we'll
22 talk about raffinate waste streams.

23 **DR. MAKHIJANI:** I guess we're awaiting your
24 white paper on that.

25 **MR. GRIFFON:** Yeah, I think the follow up is

1 you haven't completed that yet.

2 On the second action though, I just
3 want to understand, when we're moving into
4 thorium stuff, you posted some thorium data,
5 air sampling data, but I thought that was more
6 in response to the other thorium processing
7 rather than this.

8 **MR. ROLFES:** The great majority of the data
9 that we posted for the Advisory Board, at
10 least two separate Excel spreadsheets that are
11 available, the great majority of the
12 information in the larger of the two is
13 Thorium-232. Now there are some contributions
14 also in there from raffinates as well, air
15 samples. So we have separate research
16 database documents that have raffinate air
17 monitoring data, and those have not been
18 reduced into an Excel spreadsheet at this
19 time. We have provided the Thorium-232 data.

20 **MR. GRIFFON:** Can I add that in your
21 response then for number two? Instead of
22 saying done, can I add that, what you just
23 said that you have additional site research
24 documents with raffinate data that are being
25 put into Excel spreadsheets at this point?

1 **MR. ROLFES:** Yeah, that is correct. I do
2 believe we're working on reducing that
3 information into spreadsheets, or we will be
4 doing so.

5 **MR. RICH:** And also there's a white paper on
6 RU specifically.

7 **DR. MAKHIJANI:** Can I ask a question about
8 this thorium data, Fernald thorium data air
9 samples combined? Some of these samples where
10 it talks about the location actually says at
11 plant nine thorium. And then other stuff is
12 just plant nine. Is that all relating to
13 thorium? I mean, I don't know how these
14 samples have been identified as relating to
15 thorium.

16 **MR. ROLFES:** They're identified as thorium
17 gross alpha air samples.

18 **DR. MAKHIJANI:** In the original datasheets?

19 **MR. ROLFES:** Correct.

20 **DR. MAKHIJANI:** And are the original
21 datasheets posted somewhere?

22 **MR. ROLFES:** They're certainly in the site
23 research database.

24 **DR. MAKHIJANI:** And they're in the site
25 research database?

1 **MR. ROLFES:** Yes.

2 **DR. MAKHIJANI:** And is that toward the end
3 of the site -- I'm just trying to make my life
4 a little easier.

5 **MR. ROLFES:** It's in the middle, Arjun.

6 **DR. MAKHIJANI:** So that was my only
7 question.

8 **MR. ROLFES:** Bob, do you recall if when we
9 entered all those air monitoring data if we
10 cited the source, like reference ID number of
11 the --

12 **MR. MORRIS:** We probably did because we were
13 aware of needing some kind of QC on our
14 transcription. But to be honest, the details
15 of --

16 **MR. ROLFES:** Yeah, we did this quite a long
17 time ago, and I do remember that there is
18 actually, now that you mention it, a QC report
19 that we put together based on --

20 **MR. MORRIS:** I think I wrote a QC report on
21 that.

22 **MR. ROLFES:** Yes.

23 **DR. MAKHIJANI:** Yes, there is a document
24 number and a page number I see here. But
25 these document numbers wouldn't correspond, I

1 think, with the site research database number.
2 They're quite different.

3 **MR. ROLFES:** Could you provide that --

4 **DR. MAKHIJANI:** For example, it says 15,
5 001, 36, 001, 003, and then it gives a page
6 number, 001 parentheses 85, a parenthetical
7 number for the page number.

8 **MR. MORRIS:** Yeah, I almost certainly have a
9 decoder some place for that.

10 **MR. CLAWSON:** One of them little rings?

11 Any more questions on that?

12 **MR. GRIFFON:** No, I think we're on to the
13 next.

14 **DR. MAKHIJANI:** Is there anything you want
15 done with this?

16 **MR. GRIFFON:** Well, we're waiting on a white
17 paper, and we're waiting on data to be put up,
18 right? So I don't know if there's any action
19 right now.

20 **DR. MAKHIJANI:** No, I meant on the thorium
21 air sampling data where it says done.

22 **MR. GRIFFON:** No, I crossed out done.
23 Because maybe I'm wrong, but --

24 **DR. BEHLING:** Well, they did ^ on the O
25 drive. BZ sampling data and GA sampling data

1 and --

2 **MR. GRIFFON:** I guess I want to ask if any
3 of that's Thorium-230 related, or is it all
4 Thorium-232 related?

5 **DR. BEHLING:** Two thirty-two.

6 **MR. RICH:** The one that's done is thorium
7 data.

8 **MR. GRIFFON:** What?

9 **MR. RICH:** The air sampling data, I think,
10 Mark, that you list as done is thorium data.

11 **MR. ROLFES:** That's correct.

12 **MR. RICH:** And the one that we're saying is
13 yet to be done is the raffinate one.

14 **MR. GRIFFON:** Or the Thorium-230, right. So
15 I changed that from done to is in progress,
16 being translated.

17 So we'll get to the other one coming
18 up, Arjun.

19 **DR. MAKHIJANI:** But for the moment with the
20 Thorium-232 data you don't want anything done
21 with it.

22 **MR. GRIFFON:** As I said, we haven't gotten
23 to that.

24 **DR. BEHLING:** We haven't gotten to that.
25 It's part of another finding, Arjun.

1 DR. MAKHIJANI: Oh, okay, sorry.

2 FINDING 4.1-6

3 DR. BEHLING: I think the next finding is
4 yours, too, Arjun, 4.1-6.

5 MR. GRIFFON: That's the same I think, yeah,
6 4.1-6, Arjun?

7 DR. BEHLING: It's on page 34 of the report.

8 DR. MAKHIJANI: So that's the same response
9 that the white paper in preparation is.

10 MR. GRIFFON: And the white paper is going
11 to discuss that derivation of the assumptions
12 on percentages, et cetera, right?

13 MR. ROLFES: Sure, and I did want to remind
14 everyone that we do have urinalysis data
15 available for individuals that were exposed to
16 the plutonium specification materials.

17 DR. MAKHIJANI: For the '80s?

18 MR. ROLFES: Certainly, yes.

19 DR. MAKHIJANI: Not for the early ^.

20 MR. ROLFES: Yes, but it was during the '80s
21 that the highest concentrations of plutonium
22 came in the site.

23 DR. MAKHIJANI: Well, we don't have
24 measurements of the early years.

25 MR. ROLFES: Oh, we know exactly how much

1 internal exposure.

2 And I took strong exceptions to the
3 whole methodology because for the most part it
4 says, well, we have a few air concentration
5 data, sampling data, and then we now have to
6 figure out, well, what was the duration of
7 exposure. And there's a whole series of
8 assumptions that were made regarding external
9 dosimetry of 23 people which the highest 11
10 people were selected.

11 And then there was this whole cascade
12 of assumptions that says, well, if this was
13 the average for the 11 highest people who were
14 exposed at the K-65 silos, then how long could
15 they have worked there in order not to exceed
16 an administrative dose limit of four rem a
17 year. And they ratcheted down to ten weeks.
18 And then they finally ratcheted down to six
19 weeks. And if you go through the methodology,
20 you sort of say this is not science here.

21 I mean, you're basically trying to
22 define the internal exposure, duration of
23 internal exposure. You have a couple of air
24 samples, and now you're just going to say,
25 well, based on inhalation rates, how much did

1 this individual take in. And to answer that
2 question you have to know how long was that
3 person exposed.

4 In other words, to get a time
5 integrated internal exposure, you have to know
6 not only air concentration, but the exposure
7 time. And apparently, in this particular
8 exercise, they defaulted to external dosimetry
9 data. And says, well, here are 23 people
10 assigned to the K-65 silos. We'll select the
11 highest 11. That sounds claimant favorable.

12 What you're selecting is the highest
13 exposed individual and then impose over that
14 the issue of a four rem yearly dose limit.
15 And saying, well, on that basis, how many
16 weeks could they have worked on the assumption
17 that these highest 11 individuals were exposed
18 on a weekly basis. And the assumption was
19 then, well, they couldn't have worked more
20 than ten weeks.

21 And then in another statement -- and
22 I'm not sure how to explain that -- they were
23 ratcheted down to six weeks. Well, the truth
24 is the administrative dosimeter program did
25 not exist because during the '50s it was 15

1 rem a year. And there was also the assumption
2 that there were a three-shift rotation, and
3 the conclusion was that in any given year, six
4 weeks was the bounding duration for any one
5 individual to be exposed.

6 Well, I kind of looked at that and
7 said, well, this doesn't make sense. It's
8 just based on assumptions that have no
9 scientific merit. First of all, the dose
10 limit of four rem is inappropriate. And the
11 issue of 80 drums, I know there's one document
12 that says they transferred the contents of 80
13 drums in one day. But that was one day, and
14 how do you apply that to 13,000 drums is
15 another issue.

16 And the whole issue of modeling
17 internal exposures based on external dosimetry
18 data that were restricted to the highest
19 levels, and then impose on that the issue of a
20 four rem annual dose limit as an admin limit
21 is something that I won't accept as a
22 legitimate approach to modeling this data.

23 **MR. ROLFES:** What we're doing to reconstruct
24 people's internal exposures for this operation
25 is the radon breath data.

1 **DR. BEHLING:** That's exactly what I was
2 going to ask next. It's clear to me from what
3 I gather now in this dose reconstruction case
4 that you provided me with, case internal dose
5 reconstruction sample number two, and that was
6 my exact question. Are we abandoning this
7 model? Because I can't possibly accept this
8 model as legitimate.

9 **MR. ROLFES:** I would have to take a look at
10 what you're referring to. That doesn't ring a
11 bell to me. It may have been something that
12 we had just, you know, it might have been some
13 descriptive information that, I mean, the
14 people, there were a couple of people that
15 exceeded administrative limits at the site of
16 five rem in the very early time period. And
17 they were associated with this operation
18 working with the radium-bearing materials.
19 That was just another piece of information
20 that would allow us to identify who was
21 potentially involved in this operation. I
22 don't in any way --

23 **DR. BEHLING:** During this time period -- and
24 I have the documents here. These are the
25 official documents, there is a continuous

1 reference to 300 millirem per week, and
2 there's another one that talks about 15 rem
3 per year. And that has a date of 1959.
4 That's about the timeframe when we switched
5 from 15 to five as a regulatory limit.

6 So as I said, I cannot buy in on the
7 four rem admin dose limit because there's
8 clearly no reference to that in the internal
9 documents that such a dose standard was
10 exercised. And as I said, the issue was taken
11 where you had 21 workers, and then you took 13
12 workers who had the highest dose and took the
13 average of that and saying based on the four
14 rem yearly limit, they couldn't have worked
15 for more than ten weeks without exceeding the
16 limit. And then it was further ratcheted down
17 to six weeks, and the whole issue that
18 basically said no worker could be exposed to
19 the K-65 material internally for more than six
20 weeks. And then, as I said, I can't buy into
21 this --

22 **MR. GRIFFON:** This was mentioned on the site
23 profile apparently.

24 **DR. BEHLING:** That was in the site profile.

25 **MR. RICH:** It's in the technical basis

1 document for internal dosimetry. It was used
2 as an example to define that the external dose
3 would limit the workers to less than looking
4 at a full year based on the external dosimetry
5 records. And in that case then we defaulted
6 for some number above that as a maximum
7 exposure level short of a year. In other
8 words, we did not default to a full year of
9 exposure as a maximum air sampling data, air
10 sampling concentration rate that had been
11 determined from other sources.

12 **DR. BEHLING:** Well, I'll read you the exact
13 statement that's contained in the TBD: "From
14 the information derived in the external dose
15 data sheets and the air monitoring sampling
16 sheets, it appears that the transfer could
17 have been limited to a period of about six
18 weeks per year with no individual working more
19 than a period of six weeks in the year."

20 **MR. RICH:** And, Hans, we're not using this
21 approach any more.

22 **DR. BEHLING:** I realize that. I just want
23 to be sure that we can walk away from this.

24 **MR. RICH:** We're walking away from this.
25 This won't be in the next technical basis

1 document.

2 **DR. BEHLING:** Yeah, it wasn't clear whether
3 or not the radon breath data was a supplement
4 or an alternative or a complete replacement
5 with this being taken out.

6 **MR. RICH:** It's a replacement.

7 **DR. BEHLING:** On that issue and having said
8 what I just did, I do go want to go through
9 the issue of the radon dose reconstruction
10 protocol that you provided us in sample number
11 two. And again here the issue is one of the
12 plant one labor work 1952 through 1958 and was
13 exposed to radon, et cetera. And let's see
14 here, oh, this is not the one. It's the
15 internal dose reconstruction number three.
16 I'm sorry. I got the wrong one that involves
17 the radon breath sample.

18 And this case again the laborer worked
19 from '52 to '58 and was part of the K-65
20 raffinate handling. So he was one of the guys
21 who was unloading the 13,000 drums from the
22 material in the drums into the silos, too. In
23 this case it was silo number two. And the
24 statements at the bottom of that dose
25 reconstruction sample is that radon breath

1 monitoring taken at the end of the six-week
2 job loading pitchblende into the K-65 silo
3 number two.

4 Now again, I'm focusing on the six
5 weeks because it happens to be coincidental
6 value that was incorporated in the previous
7 model. And, of course, if you're looking at
8 an assessment of radon breath data, you would
9 like to do it at the end of an exposure time
10 period because, obviously based on your TIB-
11 0025, you have to assume, in order to get an
12 accurate body burden, you'd have to assume
13 that this is not taken on the first day, the
14 first week or midway in between.

15 If there is a finite duration during
16 which this person was exposed to this K-65
17 material, you would like that analysis done
18 sometime after he completes his tour of duty
19 with the K-65 transfer. Now the question --
20 and I looked at the data, and you provided
21 data for the years '52, '53 and '54.

22 And I assume that these people were
23 more than just the K-65 workers because they
24 clearly took weekly samples starting in
25 January for each year through the end of the

1 year. Meaning that this whole issue of, oh,
2 they worked around the clock, three shifts for
3 six weeks, certainly won't hold water in
4 context with the actual radon breath data
5 because I looked at the '52 and '53 and '54,
6 and they have weekly sampling from January
7 through the end of the year which means that
8 the transfer took place basically year round.

9 And it would make no sense to assume
10 that you assign people in the middle of the
11 night from 11 to seven in the morning in
12 darkness transferring stuff into the silos.
13 I'd have a tough time understanding the
14 urgency behind that effort. If you took from
15 '52 to '58, why would you confine it in any
16 given year to six weeks?

17 But anyway, the question now I have is
18 regarding the radon breath samples. When were
19 these samples taken, and to what extent can
20 you conclude that the breath data that's
21 available on behalf of these individuals, and
22 I have no question that these people were
23 monitored, were, in fact, taken at the time
24 when you can conclude that the breath analysis
25 really reflects the body burden that should be

1 done at the end of that tour of exposure?

2 **MR. ROLFES:** Well, we would have to take a
3 look at the specifics of the case to make that
4 determination. For example, we would take a
5 look at the information for that specific
6 person to see when he, in fact, started
7 working at the site or when he, in fact,
8 started working at the silos, slurring the
9 materials into the K-65 silos.

10 We would then take a look to see when
11 the bioassay result is to make sure that the
12 bioassay result was, in fact, after the
13 initial exposure could have started. We would
14 have to take a look at a specific claim in
15 order to make some sort of determination about
16 --

17 **DR. BEHLING:** But certainly, one would have
18 to be reasonably cautious about how these
19 radon breath samples are used in order to
20 assure that we're not talking about a guy
21 who's on the job the first week then given a
22 radon breath analysis. And according to this
23 example that we were given, the statement was
24 that this was at the end of a six-week
25 engagement. I mean, one has to be sure that

1 we're not making assumptions that are simply
2 not supported by the facts. Or if you don't
3 know, what do we do about it?

4 **MR. ROLFES:** That is an important point
5 because if you take a radon breath sample,
6 whether it's still material of significant
7 amounts within the lungs, the radon recorded
8 in these breath samples would be a higher
9 amount than if we took the sample down the
10 road much further because the radium-
11 containing materials would have had the
12 opportunity of passing the lungs, and --

13 **DR. BEHLING:** Yeah, yeah, I'm familiar with
14 it, but on the other hand, your total burden
15 would be considerably less if on the first day
16 versus at the end of a three month period.
17 And your model according to OTIB-0025 says
18 that we assume -- the model assumes -- that 33
19 percent of the radium inhaled remains in the
20 lungs, 39 percent in cortical bone, 14 percent
21 in trabecular bone and 14 percent in other
22 soft tissue. Those are the parameters of the
23 OTIB-0025 model. And so you recognize, and of
24 course, the emanation rate is 100 percent for
25 lung, 100 percent for soft tissue, 33 percent

1 for cortical bone and 14 percent for
2 trabecular bone. I think those are the
3 numbers that I recall.

4 And so it does take that into
5 consideration. But I believe in all instances
6 these models were based probably on animal
7 data, and then I would assume they were
8 probably beagles that they exposed to radium
9 for long-term studies. And subsequent data
10 involving obviously our friends, the ^
11 probably had different values because there
12 the long-term residence they use probably is
13 in the cortical bone and the trabecular bone
14 meaning that the release fraction is
15 considerably smaller which does affect the
16 dose calculation, too.

17 **DR. ZIEMER:** Well, and they were taking it
18 in by swallowing.

19 **DR. BEHLING:** Yes, ingestion.

20 **MR. ELLIOTT:** Basically, your caution here
21 is, Hans, that we use radon breath data
22 appropriately. That we don't pick a data
23 point that is very early in the campaign or
24 the exposure experience.

25 **DR. BEHLING:** Yes.

1 **MR. ELLIOTT:** That we look at the breath at
2 the end of the exposure. I think we
3 understand that. We accept that.

4 **DR. BEHLING:** And because there's, I mean,
5 this is a very, very insensitive test. And
6 according to OTIB-0025, the multiplier is one
7 picocurie per liter in breath, exhaled breath,
8 converts to 250,000 picocuries in the body
9 using the model I just described. So you
10 don't have to be off by much, you know. If it
11 goes from one picocurie to two, you multiply
12 the source term in the body. So it's a very
13 insensitive protocol to begin with.

14 And then you also realize that that's
15 just your starting point. Now you have to go
16 back to the core sampling in silo one and two
17 to extract the secondary data it says in
18 addition to the Radium-226 that I'm measuring
19 by means of a surrogate measurement in radon
20 breath, you have to now assess for thorium and
21 all the other decay products that are
22 concurrent in silos one and two. So you
23 realize there's a tremendous amount of
24 extrapolation, extrapolation.

25 **MR. ROLFES:** I agree. It's highly

1 verify with Mallinckrodt. It was just a brief
2 preparation for this meeting. So that really
3 reinforces Hans' question in a very specific
4 way is that there are no data for the period
5 in which you would assume there was the
6 greatest exposure, at least none that have
7 been posted.

8 **MR. ROLFES:** I would have to take a look in
9 our site research database. There may be
10 additional documents.

11 **DR. MAKHIJANI:** Yeah, no, I'm just talking
12 the current status. The current status, I
13 looked at all the data. I looked at every
14 single data sheet. That's the only really
15 careful thing I did in going through what's
16 new on the O drive because I was very curious
17 about how much radon breath data there is.
18 And for two out of three years the data are
19 pretty skimpy.

20 For '52 there's very little, lots of
21 missing data, and the sample sheets are quite
22 clear, and there are quite a few concerns
23 about things. And the most important thing
24 perhaps is that data, there are no data after
25 1954, and you had continuing exposures along

1 these lines into the 1950s. I don't know the
2 last year that the high radium-content ores
3 were done, but certainly Mallinckrodt was
4 transferred in 1955.

5 So is there ongoing research or do you
6 have some data?

7 **MR. ROLFES:** I'm thinking back to what we
8 had. I recall seeing some memoranda regarding
9 measuring beta activity in urine from radium
10 during this period. Or, excuse me, they were
11 trying to quantify, in addition, there was a
12 memorandum, I don't recall if I have it with
13 me or not, but actually during February of
14 1955, this memorandum indicated that they were
15 looking into monitoring radium exposures via
16 urinalysis in addition to the radon breath
17 sampling. We have seen some employees in the
18 early time period, roughly corresponding with
19 this time period, who have beta activity
20 results reported in their DOE dosimetry files.

21 **DR. MAKHIJANI:** Radium-226 or beta?

22 **MR. ROLFES:** I'm sorry?

23 **DR. MAKHIJANI:** Beta activity?

24 **MR. ROLFES:** Yes, beta, beta activity, yes.

25 **DR. MAKHIJANI:** How did that relate to

1 Radium-226?

2 **MR. ROLFES:** I do not know if they were
3 trying to quantify other radionuclides that
4 they were potentially exposed to, but it was
5 listed as something associated with the radon
6 breath testing. So it's, I agree, it's
7 something that we need to take a look into.
8 We'll certainly take another look at the data
9 that are available and see if we can request
10 additional records regarding radon breath
11 testing.

12 **DR. ZIEMER:** Do we know what happened after
13 those dates in terms of bioassay even? Were
14 they looking at radium body burdens by another
15 method after that date? What was the final
16 date that you mentioned?

17 **DR. MAKHIJANI:** Well the date on the O drive
18 was December 1954. And there are no data that
19 I saw. They start in March 1952. There's one
20 sample seen from '51, but I think that might
21 be a --

22 **MR. ROLFES:** I'm going to ask Bryce or Bob
23 to add a little bit to this discussion because
24 we did ask the individuals who we spoke with,
25 former employees from Fernald, about the

1 personnel who were potentially exposed to this
2 operation as well as the types of materials
3 that were coming in so that we made sure that
4 we were aware of some of the types of source
5 terms that were coming in, either the radium-
6 bearing materials that were brought in or the
7 ore concentrates that did not have the radium
8 associated with it. There are additional
9 details in our transcripts of these interviews
10 which we will make sure that we're making
11 available as soon as they're reviewed by the
12 interviewee.

13 **DR. ZIEMER:** So the radium may no longer
14 have been an important source term at that
15 point?

16 **MR. ROLFES:** That may be the case. I'd have
17 to take a look.

18 **DR. ZIEMER:** That's a possibility?

19 **MR. MORRIS:** I think the Belgian Congo ores
20 are really some of focus.

21 **DR. ZIEMER:** Pitchblende was --

22 **MR. MORRIS:** That's right, and by then -- I
23 can't speak to the exact date off the top of
24 my head right now, but in the middle-to-late
25 '50s the Belgian Congo ores were completely

1 finished. There was no more raffinates left
2 that were moving through the system based on
3 that input stream. So it could be that their
4 perceived need ^ by that time.

5 **MR. RICH:** There were two plant sites, the
6 hot raffinate site which was a shielded
7 facility, and it's hot because it had a lot of
8 radionuclides. It was radiologically high
9 levels of external radiation. They also did
10 the transfer of the Mallinckrodt waste and the
11 Niagara waste that came to the site, some
12 13,000 barrels of waste that were then
13 transferred over a, about a -- I forgot now,
14 three or four year period --

15 **DR. BEHLING:** I have here according to what
16 I remember from the TBD, '52 through '58 was
17 the transfer of those 13,000 drums.

18 **MR. RICH:** And that was done in a slurry
19 transfer station out near the silos. So it
20 was not specifically in plant two and three.
21 It was dumped, slurried and then pumped to the
22 silo.

23 **DR. MAKHIJANI:** And the pitchblende was,
24 according to the site profile, revision zero,
25 pitchblende was, from '53 to '55 ^ pitchblende

1 ore so you have '55 in there. And they said
2 the '53 data are pretty, less than, maybe less
3 than 50 percent of the data are there, and
4 there are none from '55 onward.

5 **DR. ZIEMER:** But it sounds like a process
6 change.

7 **MR. RICH:** It shifted then from processing
8 high uranium-bearing ores to the U.S. supply
9 that came directly from mill sites. They had
10 already been, the daughter product had already
11 been removed there. And so it then came into
12 the sites and they used both the hot and the
13 cold sites then for the processing in plant
14 two and three. And those raffinates were much
15 lower.

16 **DR. ZIEMER:** I just wanted to make sure that
17 the creation of the radium bioassays coincides
18 with what, our continuing need for uranium
19 bioassay. I think it was too early for them
20 to have switched to whole body counting.

21 **DR. BEHLING:** No, that didn't occur until ^.

22 **MR. RICH:** I don't know very many ^ that did
23 a lot of radon breath sampling ^ anyway. It
24 was a somewhat empirical analytical technique
25 that we do have a significant database at

1 Fernald because of the fact that they were
2 handling so much of the higher raffinates or
3 the high radium process stream material. That
4 gives the, an insight into the level of intake
5 or deposition during that highest potential
6 exposure period. And as a consequence and
7 they used that to develop a bounding intake.

8 **MR. ELLIOTT:** How many workers are we
9 talking about? How labor intensive was this?

10 **MR. RICH:** The process plants two and three
11 for the high process periods were upwards of
12 100 people, and we've been told that that
13 workforce was both from the head end to the
14 back end and all of those areas. The average
15 workforce was much lower than that. That 100
16 is their estimate of the workforce at the
17 highest process period where they were running
18 all sections of the plant, but that's 100 ^.
19 And typically, they anticipate that the ^ and
20 the raffinate would be in the 25 workforce
21 level.

22 **MR. CLAWSON:** Did this go on 24 hours a day
23 or is this --

24 **MR. RICH:** Yes, yes.

25 **DR. BEHLING:** Why was there such an urgency

1 when it was expected to run for a few weeks in
2 any given year? Why would you subject people
3 to be in the middle of the night out in the
4 cold?

5 **MR. RICH:** Part of the problem there and one
6 of the reasons why, you know, these drums
7 setting around on the pad for long periods of
8 time were reading, a general background was in
9 the range of about 300 millirem per hour in
10 those storage areas.

11 And so when they were working the
12 drums, you can't burn out your people, burn
13 them out by, you know, they approach their
14 radiological, external radiological dose
15 levels relatively fast. So they either did
16 it, and we don't know. We don't know whether
17 they did it in a short period of time or
18 rotated people in and that, based on the
19 analytical external dose data, it appears that
20 there were a crew of -- I forget -- five to
21 six people that did the drum transfer
22 operation.

23 And so a larger standpoint if they
24 were operating, if they're transferring at a
25 certain rate over a period of time and doing,

1 you know, we played that game. And it all
2 comes out the same anyway because but it's
3 probably external dose limited on small teams
4 of people.

5 **DR. BEHLING:** Well, I guess what I couldn't
6 grasp was if they worked a three-shift
7 rotation year around, I'd say they were
8 looking to expedite the removal of this
9 material into the silos. On the other hand --

10 **MR. RICH:** They would have finished in much
11 less of a time period.

12 **DR. BEHLING:** Yes, of course, I mean, 80
13 drums a day as was suggested in the TBD if you
14 move it by times 250 days out of the year for
15 working, it doesn't take you six, seven years.

16 **MR. RICH:** It was done in a year and a half.

17 **DR. BEHLING:** And so the question I had all
18 along was, was this something of an assumption
19 that had no basis. In other words, I would
20 understand three-shift rotation year round if
21 the intent was to expedite this, but not a
22 three-shift rotation and then do it six weeks
23 and then stop. That doesn't make sense.

24 **MR. RICH:** It looked like from the data
25 sheets that they had four shifts. I know four

1 groups of five people that they were working
2 in. So that led us to the conclusion
3 initially that they were operating on a, at
4 least on a two or three shift --

5 **DR. BEHLING:** I remember looking at those
6 data, and my feeling was that they may have
7 been workers who were basically dealing with
8 raffinate waste that was being produced around
9 the clock rather than the transfer of 13,000
10 drums. And my gut feeling was that the three-
11 shift rotation may involve personnel who were
12 involved in transferring the liquid raffinates
13 that were being produced as part of the
14 process there.

15 **MR. RICH:** It's been a number of years since
16 I looked at that data sheet, but I think as I
17 recall, they were identified as the drum
18 transfer operation.

19 **DR. BEHLING:** I don't remember getting that
20 information from the data sheets.

21 **MR. GRIFFON:** Can I go back to the actions
22 and ask, I think the follow up I have is NIOSH
23 will further assess the current lack of radon
24 breath data after 1954. Is ^ '55 question?

25 **DR. BEHLING:** Arjun, do you have breath data

1 for '54? I only have '52, '53 and '54.

2 **DR. MAKHIJANI:** There are some data for '54.

3 **DR. BEHLING:** There are data for '54?

4 **DR. MAKHIJANI:** And not, every year is
5 incomplete.

6 **DR. BEHLING:** I didn't look at data for '54.

7 **MR. ROLFES:** I believe there's three data
8 sheets that have '52, '53 and '54.

9 **MR. GRIFFON:** And then I also had an SC&A
10 action item here, possibly. Can SC&A provide
11 a written review of the white paper? The
12 white paper's available. You made some
13 comments on it. I think it might be useful to
14 write that out.

15 **DR. MAKHIJANI:** White paper?

16 **MR. GRIFFON:** The white paper is referenced
17 in this response and provided. I don't know.
18 Is the white paper the same as TIB-0025 or is
19 it in addition to?

20 **MR. SHARFI:** I think it's what we used for
21 the sample DR.

22 **DR. BEHLING:** Is there a white paper? I
23 think --

24 **MR. MORRIS:** I think all we did, it's been
25 awhile since I wrote it. I think it just

1 summarizes the data that you got and puts the
2 distribution around it.

3 **MR. GRIFFON:** Well, I mean, Arjun made some,
4 at least raised some questions about the
5 completeness and stuff like that. I guess I
6 want to formalize SC&A's response to this. Is
7 this complete enough for dose reconstruction?
8 I think we need a formal response on the
9 table.

10 **DR. MAKHIJANI:** Right. If the dose
11 reconstruction relates to the years for which
12 there are data, then obviously --

13 **MR. GRIFFON:** Well, one action is that NIOSH
14 is going to look beyond '54, but given the set
15 you have now, I think you need to give us a
16 written assessment of that as well.

17 **DR. ZIEMER:** Is there a white paper or not a
18 white paper?

19 **MR. GRIFFON:** Apparently, there is.

20 **MR. ROLFES:** Yeah, there is.

21 **DR. ZIEMER:** And it's called?

22 **MR. ROLFES:** It should be in, if you take a
23 look at the internal dose reconstruction
24 folders, what sample number?

25 **DR. BEHLING:** That was sample number three,

1 I believe.

2 **MR. ROLFES:** You take a look in number
3 three. It should be located in with that.

4 **MR. SHARFI:** ^ post-'54 we have seen
5 claimant files with radium urinalysis data
6 post-'54, and we have done assessments for
7 those claimants where they had actually
8 urinalysis data like in '57 where it looked
9 like they were working on that job. And they
10 did have high external records in the same
11 time, deep doses are in the same time period
12 they had these radium urinalysis. So they may
13 have switched over to a urinalysis program.

14 **MR. GRIFFON:** That could be a follow up,
15 yeah. If you find that out, that's great.

16 **MR. SHARFI:** I can only speak for a few
17 claims where we've actually seen this data in.

18 **MR. ROLFES:** Yeah, we've seen those results
19 in a very limited number of cases, and we've
20 been tracking this down. We've been asking
21 about this for a long time.

22 So I had asked an interviewee who came
23 on right after these urine samples were
24 collected during the time period that these
25 urine samples were collected. He wasn't able

1 to provide any additional information, but
2 we're certainly, you know, it's certainly
3 something that's out there that we currently
4 have no method to interpret right now.
5 There's data there, but we're not sure exactly
6 what it's for.

7 **MR. GRIFFON:** Also, for response number one
8 I edited, and I'm keeping these in red line
9 form, so I'll circulate them, Mark, for your
10 review and make sure that they're accurate.
11 But I changed "provided radon breath", I think
12 it said, "and thorium air monitoring data". I
13 said, "provided radon breath data. Raffinate
14 air data is being assembled into a spreadsheet
15 as we discussed in Finding 4.1-5." So this
16 again is the raffinate data. It's not the
17 Thorium-232 air data, right?

18 (no response)

19 **MR. GRIFFON:** You see I'm looking at
20 response number one, so I crossed out
21 "provided thorium air monitoring data" because
22 you really haven't provided that related to
23 the raffinate. That's being assembled, right?
24 And I want to distinguish between the two.

25 **MR. MORRIS:** We're pulling it together.

1 the same methodology, and so I don't recall if
2 we just decided that TIB-0025 essentially had
3 all the data, and instead of citing the white
4 paper, we already went to an approved
5 document. So that may have been the case that
6 we used an approved document rather than the
7 white paper.

8 **DR. MAKHIJANI:** Mark, can I ask a question
9 about the Thorium-230? What matrix are you
10 using for calculating the Thorium-230 exposure
11 after the Belgian Congo ore stopped? Because
12 at that point the radium became much less of a
13 concern because the radium was already taken
14 out at the mill. And then you've got
15 basically the silo three material, the ^ metal
16 oxide stuff.

17 **MR. ROLFES:** That's a good point.

18 **DR. MAKHIJANI:** Mostly Thorium-230. What
19 are we doing with that?

20 **MR. ROLFES:** We spoke with individuals that
21 had first-hand knowledge of what was going on
22 at the site. And it was the same individuals
23 that were working on both the radium-bearing
24 materials on the hot side of the refinery and
25 the same people would work on the cold side of

1 the refinery as well. So they were both
2 potentially exposed to the same materials.

3 If you take a look, the silo three
4 material only has, well, not only, but silo
5 three material does not contain the radium.
6 However, if you take a look at the silo one
7 and two concentrations of Thorium-230, those
8 concentrations exceed the concentrations in
9 silo three. So we feel that a radon breath
10 bioassay data would be representative of all
11 people exposed potentially to these raffinates
12 because it was the same work population, same
13 worker population.

14 And we feel that the intakes based on
15 the isotopic ratios from silos one and two
16 would account for exposures to silo three
17 material because the Thorium-230
18 concentrations in silos one and two, in fact,
19 exceed those in silo three.

20 **DR. MAKHIJANI:** Is that in your white paper?
21 I'm wondering if it's documented somewhere.

22 **MR. ROLFES:** We weren't able to locate the
23 white paper so this may not be there, but it
24 is documented in our drafts of our interviews
25 that we conducted with old Fernald employees.

1 And as soon as those are finally approved, or
2 approved in a final version by the
3 interviewees, we'll be sure to make those
4 available.

5 We discussed many of these issues with
6 former Fernald employees. We felt that that
7 was the best source of information that we had
8 at our hands in addition to the records. And
9 I believe we probably got probably 75 pages
10 roughly of documentation from these
11 individuals. So we're working as fast as we
12 can to get everything to make that available.

13 **MS. BALDRIDGE:** Mark, ^ here. When I was
14 preparing this petition that you've gone to
15 one of the meetings for the former Fernald
16 workers, I was told that I was wrong about the
17 thorium in plant six, that I was going to make
18 a fool of myself because the person who was
19 talking to me had worked at six, and he knew
20 thorium had never been there despite the fact
21 of the documentation. So my point is many of
22 the people who have worked there who have
23 given you information may be 100 percent
24 correct, but there are others who think they
25 are more of an expert than they are. And

1 that's my personal experience.

2 **MR. ROLFES:** Sure, you also have to consider
3 that the things that are being recalled are
4 going back 50 years and some of the people
5 that we're speaking with vary in, you know, I
6 mean, there's certainly a distribution of ages
7 in this room, and by no means do I mean that
8 as an insult at all.

9 So anyway, we have to consider
10 information from all sources, and we do our
11 best because we're not always going to have a
12 100 percent agreeing, not everything's always
13 going to agree. We just need to make the best
14 available information, excuse me, the best
15 sense of the available information from all
16 sources. We don't rely on solely one person's
17 input.

18 We consider input from a variety of
19 sources. We have very open public comments
20 that we receive. We receive comments from
21 professionals from other sites. We receive
22 information from a variety of information
23 sources including technical documents,
24 including just a wide variety of sources that
25 we consider. We're not looking to, we want to

1 make sure that we consider any potential
2 issues.

3 **MR. RICH:** Mark, can I just add a note being
4 one of the older ones here? We have recently
5 retrieved a number of very good historical
6 documents dealing with a number of different
7 processes and plants. And in addition to
8 that, and in concert with those histories and
9 plant documented histories, we've interviewed
10 a number of very experienced -- I won't say
11 old -- but experienced people that hearken
12 back to the era when those documents were
13 written. It fills in, those interviews give a
14 feeling and an understanding, a better
15 understanding, of the documents themselves.
16 I'll just leave it at that.

17 **MR. GRIFFON:** These documents you're talking
18 about, have they been posted or --

19 **MR. RICH:** I think most of them are on the O
20 drive.

21 **MR. ROLFES:** They're certainly on the site
22 research database. There is --

23 **MR. RICH:** There may be some that are not;
24 however, they're recent additions.

25 **MR. ROLFES:** I don't want to, you know, when

1 we get up to the volume of records that we're
2 placing on the O drive, we're essentially
3 going to be providing a copy of the site
4 research database. I mean, we're dealing
5 with, you know, these are not a small number
6 of documents that we're dealing with. As I
7 mentioned before, we are referring to
8 thousands of documents that we have in the
9 database for Fernald. I mean --

10 **MR. RICH:** In fact, I was just reading a
11 recent document that addressed plant six, and
12 which is a recently recovered document that is
13 a historical document in addition to plant
14 nine and some of the others on the way on the
15 plane.

16 **MR. GRIFFON:** When I said the O drive, I
17 meant the site research database.

18 **MR. ROLFES:** Yes, yes, they are on the site
19 research database. So everything that we
20 recover for a site is typically put on this.

21 **MR. CLAWSON:** We kept hitting around this
22 white paper, and I'm, so where is this white
23 paper at?

24 **DR. ZIEMER:** It doesn't exist.

25 **MR. ROLFES:** I don't believe it exists

1 because we determined --

2 **MR. RICH:** Which one?

3 **MR. ROLFES:** The white paper that we're
4 referring to is for the interpretation of the
5 radon breath data.

6 **DR. WADE:** It's a virtual white paper.

7 **MR. ROLFES:** I believe we had proceeded with
8 putting a white paper together; however, I'd
9 have to take a look back. This was done
10 probably six months ago or more, and what I
11 believe we ended up doing is just, rather than
12 putting a white paper out for the
13 interpretation of radon breath data, we used
14 an approved document, OTIB-0025.

15 **MR. RICH:** I might just say that the section
16 in the technical basis document which is under
17 much revision, there is a revised K-65 radium
18 breath analysis in that section. Consider
19 pulling that out as a white paper to make it;
20 we have not done that yet. However, several
21 other of the sections have been pulled out as
22 white papers for interim use.

23 **MR. GRIFFON:** So has SC&A reviewed TIB-0025?

24 **DR. BEHLING:** I didn't review it. I don't
25 know who within SC&A did. I probably would

1 have had a few questions about it, but we
2 approved it, and I guess that's final.

3 **DR. ZIEMER:** Well, a comment here says an
4 example dose reconstruction was provided, and
5 I think we have that.

6 **MR. ROLFES:** Yes, that's correct.

7 **DR. ZIEMER:** This is internal three.

8 **MR. GRIFFON:** Also, we can't really review
9 this TIB because it's in a technical basis
10 document, and it's still not released.

11 **MR. RICH:** It's in a reasonably complete
12 form at this time. It might be, we would need
13 to talk about that whether we need to make a
14 white paper out of that or not.

15 **MR. CLAWSON:** So what are we doing?

16 **MR. GRIFFON:** Yeah, what's --

17 **MR. CLAWSON:** Which way are we going?

18 **MR. GRIFFON:** Instead I think I'm going to
19 rephrase that to say SC&A will review that
20 example DR.

21 **DR. BEHLING:** I've already done that.

22 **MR. GRIFFON:** You've done that? Okay.

23 **DR. BEHLING:** There's not much to review.

24 **MR. GRIFFON:** SC&A has reviewed --

25 **DR. BEHLING:** If you apply OTIB-0025 and you

1 applied the radiation ^ of your neutron mix of
2 silo two, you come up with a value, and
3 there's not much --

4 **MR. GRIFFON:** So we don't have anything to
5 do except if we get the section from the
6 technical basis --

7 **DR. BEHLING:** My concern here was strictly
8 one of when was this radon breath analysis
9 done relative to the completion of the work in
10 transferring this material because that's
11 obviously the critical uncertainty parameter
12 that has to be looked at in doing dose
13 reconstruction.

14 **MR. ROLFES:** And I think we'll expand our
15 discussion of that certainly within our white
16 paper or in --

17 **MR. RICH:** The transfer of the 13,000
18 barrels or drums and the process of the Congo
19 ore was done simultaneously. And so even
20 though they were different places, the radon
21 breath sampling was done early in that period.

22 **MR. GRIFFON:** So I'm just going to leave a
23 NIOSH action at this point, further assessment
24 of their lack of data after '54.

25 **MR. CLAWSON:** In this white paper you were

1 talking about, Paul, could we put in a
2 possible white paper?

3 **MR. ELLIOTT:** I guess it depends on how
4 close we are to producing an approved
5 technical basis document.

6 **MR. GRIFFON:** Right.

7 **MR. ELLIOTT:** And if we're real close to
8 that it makes more sense to me to put that on
9 the table for you to look at than it does a
10 white paper. As we're working on finalizing,
11 then these things start passing in the night,
12 and we don't know where we're at in our
13 position.

14 **MR. RICH:** The only justification for a
15 white paper is that it takes less review, less
16 time. It's more readily available. However,
17 the longer you go --

18 **MR. ELLIOTT:** A white paper gives the
19 working group a sense of the direction that we
20 think we're going, and are we okay in that
21 direction in their view. So I think we're far
22 enough down the way here on radon breath that
23 we ought to be able to produce a technical
24 basis document in an approved status I
25 believe.

1 **DR. BEHLING:** Well, some issues you
2 addressed regarding the absence of breath data
3 for people who may have been there. And I'm
4 looking through some of the data sheets, and
5 that week's sample comes back, and it's lost
6 and there's no data. Whether or not those
7 people were re-sampled is another question I
8 haven't figured out.

9 But there may be obviously people who
10 were never monitored or were not monitored
11 throughout this period. What will be done on
12 their behalf to assess their exposure when the
13 data simply isn't there, or you don't trust
14 the data? Will there be a coworker model or a
15 50th percentile of all the data that you have
16 available or something we said about what do
17 you do when you don't have the data for a
18 worker who you know was assigned to the K-65
19 operation?

20 **MR. RICH:** As we've indicated, there's some
21 additional data also, general air sampling
22 data, that's becoming available that can be
23 used to validate that sampling, and also to
24 extend that radon breath analysis period into
25 the succeeding years, the post years. And

1 functionally, that's the way we're going to
2 need to go if the air sampling data is there
3 primarily because the character of the
4 raffinates also changed and the
5 characterization, the isotopic
6 characterization --

7 **DR. BEHLING:** Yeah, I didn't want to get
8 into that, but obviously the first few drums
9 that were transferred, the profile and from
10 the core sampling we have average values for
11 each of the nuclides that essentially covered
12 the full duration and full ^ of the silos;
13 however, that's likely to change obviously.
14 Early material that was transferred may have
15 been different from latter periods --

16 **MR. RICH:** Except that even the Mallinckrodt
17 raffinates were also pitchblende ores
18 raffinates. So the character is consistent
19 from Mallinckrodt to Fernald. And anything
20 that went in the silos was from that source.

21 **DR. MAKHIJANI:** Well, silo one.

22 **MR. RICH:** Silo one and two.

23 **DR. MAKHIJANI:** Two is a little bit
24 different than one.

25 **MR. RICH:** It's a little different, but the

1 ^.

2 **DR. BEHLING:** Well, it may be a minor point
3 that can't be resolved.

4 **MR. ROLFES:** Just one point, Mutty
5 identified that we do have Radium-226 bioassay
6 in some files for Fernald.

7 **MR. CHEW:** Nineteen fifty-seven period,
8 right, Mutty?

9 **MR. SHARFI:** This particular claimant had
10 actually urinalysis data for Radium-226 in
11 their claimant file.

12 **MR. GRIFFON:** You can discuss that when you
13 look beyond '54 if you have bioassay ^.

14 **MR. RICH:** As it turned out there's a
15 variety of sources of information that we try
16 to put together in the ^ analysis, and do the
17 best you can.

18 **MR. CHEW:** I think the more difficult
19 question is what Hans asked is what of the
20 people that should have been monitored and
21 wasn't monitored for those early periods?

22 **MR. GRIFFON:** Or how do you deal with how
23 you monitored people were in that area?

24 **MR. CHEW:** How do you monitor people that
25 were at that area?

1 **DR. MAKHIJANI:** I mean Hans raised this
2 briefly, but what concerns me was an earlier
3 point I raised in terms of whether there's
4 anything to do which is the qualities of the
5 overall, not the protocol of measuring radon
6 breath, but the quality of the overall
7 procedure that was actually carried out
8 because a lot of samples were lost, and we
9 don't know, and there isn't much data. So for
10 some years, for two of the four years, there
11 isn't much data. Two of four years there are
12 about 50 percent of the ^ data for people
13 identified. And for the third year there's
14 much less than 50 percent.

15 **MR. MORRIS:** In '52 there were 84 valid
16 samples, 140 samples were shipped. In '53
17 there were 238 samples shipped, and 183 of
18 them came back with valid data. And in '54
19 231 samples shipped and 182 came back with
20 valid data.

21 **DR. MAKHIJANI:** When I say 50 percent and
22 less than 50 percent, I'm just telling you the
23 weeks for which there are reported data, even
24 in any reported date in the data sheet. There
25 are weeks that have no, they were doing this

1 weekly, and there are a lot of sample data
2 sheets that are simply not there. And the
3 notations and some letters that are there in
4 the files that are on the O drive indicate
5 that they were having some problems in the
6 transfer of these flasks and closing them
7 properly, and some indication they didn't
8 handle these things right to make sure that
9 it's done properly and so on. A few.

10 **MR. GRIFFON:** This is why I was asking you
11 to review the white paper, but I guess we've
12 got to kind of wait and see if it comes out on
13 a tech basis, and you know, more specifically.

14 **DR. MAKHIJANI:** Yeah, there is a question on
15 the quality of the data as to whether what we
16 read in the flask actually wound up in the
17 lab.

18 **DR. BEHLING:** And these were all one minute
19 samples assuming that they basically monitored
20 the equivalent of 20 liters worth of exhaled
21 air?

22 **MR. RICH:** This is an analytical procedure
23 that's not used much any more. They were
24 trying it out at that time.

25 **MR. CLAWSON:** Ad nauseum comment.

1 **MR. GRIFFON:** Ready for the next one.

2 **MR. CLAWSON:** Well, let's talk about
3 something first. It's 4:35 right now. We've
4 made through seven pages of the 22 pages that
5 are here. My question is, is if we have one
6 that we really need to be working on or so
7 forth, my issue is we're not going to get
8 through this paper today. I know that's a,
9 that was a pipe dream to be able to do, but it
10 also brings up a question of when we can get
11 back together again to be able to continue on
12 through this, be able to get all the issues
13 out on the table and start being able to work
14 on them. And I wanted to, because I know
15 there's going to be a lot of discussion about
16 it, is throw out a time that would best suit
17 the people to be able to get together and be
18 able to do this. I know Ray's got some stuff
19 coming up and so forth, but I think it's very
20 vital that we get, we're able to return back
21 to this and make this through this paper.

22 **DR. WADE:** Well, the Procedures work -- to
23 give you food for thought -- the Procedures
24 work group will meet in Cincinnati on the 11th
25 of December. There's lots of overlap between

1 the two groups. That's the next face-to-face
2 meeting that I'm aware of of the work group,
3 any element of the Board, I'm sorry. So it
4 doesn't mean you have to be given by that, but
5 it gives you a --

6 **MR. GRIFFON:** When is that again?

7 **DR. WADE:** The 11th of December, the
8 Procedures work group. Now you might want to
9 meet before then, that's fine. I'm just
10 giving you a moment in time when, for example,
11 Ziemer, Mark, who else at Procedures?

12 **MR. CLAWSON:** And I want to throw something
13 else out, too. Possibly being able to
14 schedule maybe two days for this. If we
15 can't, it's not, because we've got a lot of
16 issues in this, and we're plugging along, and
17 we're doing really good, but we still have an
18 awful lot to still be able to go over. If we
19 can't do it, then that's the way it goes, but
20 I'd like to be able to get through this matrix
21 and be able to proceed forward.

22 **DR. WADE:** Can you wait 'til the middle of
23 December or do you want to go earlier? You
24 have to leave time for things to be done by
25 the people --

1 **MR. GRIFFON:** Well, we haven't even gotten
2 through the --

3 **DR. BEHLING:** We're not reviewing the stuff
4 that we have action items. We're just trying
5 to get through what we have today.

6 **MR. GRIFFON:** Yeah, right.

7 **MR. CLAWSON:** Well, my question --

8 **DR. BEHLING:** We can do it anytime soon. It
9 doesn't matter. We're not waiting for
10 anything.

11 **MR. CLAWSON:** So November --

12 **DR. BEHLING:** Schedule the day before
13 Thanksgiving. We'll get it all done in one
14 hour.

15 **MR. CLAWSON:** I'm afraid, you know, being
16 out there with this rousing conversation, I
17 can just picture when a lot of Health
18 Physicists get together what they talk about
19 because it was pretty good.

20 **MR. GRIFFON:** How about November 1st? This
21 is probably impossible for people to schedule
22 this this soon.

23 **DR. WADE:** Well, we have a mini-call of the
24 Procedures work group on November 1st.

25 **MR. PRESLEY:** I can't be here. I've got

1 2:00 p.m. eastern standard time written down.

2 DR. WADE: And we have a Blockson call on
3 the second.

4 MR. GRIFFON: Well then, we're into the next
5 week I guess.

6 DR. WADE: So the next week is what, the
7 fifth, sixth?

8 MR. GRIFFON: Seventh, we have a work group
9 call for Procedures.

10 DR. WADE: The sixth is Election Day. The
11 eighth, do you want to try a phone call?

12 MR. CLAWSON: I think until about the first
13 time we get through this matrix I really think
14 face-to-face would be the best.

15 DR. WADE: Do you want to try the eighth?

16 MR. CLAWSON: What's that?

17 MR. PRESLEY: I can't be here on the eighth.

18 DR. WADE: Twelfth?

19 MR. PRESLEY: That whole week I'm free.

20 DR. WADE: How about the 13th? I heard you
21 say you possibly could --

22 DR. MAKHIJANI: I possibly could be on the
23 12th.

24 MS. HOWELL: The 12th is a federal holiday.

25 DR. WADE: The 12th is a federal holiday.

1 The 13th?

2 **MR. GRIFFON:** The 13th?

3 **MR. CLAWSON:** How about maybe the 13th and
4 the 14th? Okay, let's try the 13th then.

5 **MR. GRIFFON:** I think the 13th. We can get
6 through half a matrix in one day.

7 **DR. WADE:** So the 13th, do you want to start
8 at nine? This hotel, if possible?

9 **MR. CLAWSON:** Good.

10 **DR. WADE:** It shall be so.

11 **MR. GRIFFON:** So does that mean we're
12 adjourning for today?

13 **DR. BEHLING:** We can at least clean up 4.2-2
14 because that's Arjun's. I don't want to end,
15 to run away from this thing.

16 **DR. MAKHIJANI:** Which page are we on?

17 **DR. BEHLING:** We're on page 46 and on the
18 matrix --

19 **MR. CLAWSON:** Matrix it's page 7, 4.2.

20 We need to take a real short break.

21 (Whereupon, the working group took a break
22 from 4:45 p.m. until 4:52 p.m.)

23 **DR. WADE:** We're back in session.

24 **FINDING 4.2-2**

25 **MR. CLAWSON:** We're going to proceed on in

1 the matrix with 4.2-2.

2 **DR. MAKHIJANI:** I think that's an item where
3 that's the same as the earlier one where NIOSH
4 provides the analysis, right?

5 **MR. SHARFI:** It relates back to 4.1-5.

6 **MR. GRIFFON:** Yeah, it's in draft form.

7 **DR. MAKHIJANI:** I think that was their
8 response. White paper is in preparation. We
9 didn't ask earlier if the white paper's
10 prepared, do you want us to look at it or wait
11 until the next meeting or --

12 **MR. ELLIOTT:** Again, it may not be a white
13 paper. It may be a technical basis document.

14 **MR. CLAWSON:** Okay, so we could put under
15 the comments on that that whichever, white
16 paper, technical data --

17 **MR. ELLIOTT:** This is a different one?

18 **MR. GRIFFON:** It's not the radon breath
19 issue.

20 **DR. MAKHIJANI:** RU.

21 **MR. GRIFFON:** It's the RU. Does the same
22 thing apply? Is it rolled into that tech
23 basis or is this a separate, because we've got
24 white paper here again.

25 **MR. RICH:** The RU one is in preparation. It

1 should be finished shortly.

2 **MR. GRIFFON:** Okay, so that's a white paper.
3 So that's different.

4 **MR. MORRIS:** Our newest interview
5 transcripts have a lot of data on this topic.

6 **MR. GRIFFON:** Right, and it says and
7 interview information.

8 **MR. MORRIS:** So we're referring back to 4.1-
9 5.

10 **MR. GRIFFON:** I mean, we didn't ask should
11 we add in there when made available, SC&A
12 should review. I mean I think we want that to
13 happen, so I think we need to state it. I'll
14 put it under 4.1-5.

15 **FINDING 4.2-3**

16 **DR. MAKHIJANI:** The next one is yours, Hans.

17 **DR. BEHLING:** Yeah, the next one involves
18 radon, and radon emanating from silos one and
19 two. And the original TBD made some reference
20 to the RAC 1995 study that estimated on
21 average somewhere around five to six thousand
22 curies per year that was being released. And
23 that was based on some information that
24 involved emanation through the walls because
25 by that time there had been a dome cap put on

1 silos.

2 And I looked at the data, and I said,
3 well, that's kind of a questionable model for
4 using diurnal variations in atmospheric
5 pressure that would then force the radon out
6 in the head space, et cetera, et cetera. So I
7 simply looked at the actual data from the core
8 sample in silos one and two and looked at just
9 the disequilibrium between Radium-226 and
10 Polonium-210 and Lead-210.

11 And I realized, well, this is an
12 obvious no brainer. If you have 477
13 nanocuries per gram of Radium-226, but you
14 only have 202 nanograms (sic) per gram of
15 Lead-210, there's obviously a discrepancy here
16 that has to be accounted for by the loss of
17 radon as the intermediate radionuclide.

18 And on that basis I calculated that
19 you would probably lose not five or six
20 thousand but 60 or even up to 90 depending on
21 which radionuclide you would select in terms
22 of the disequilibrium. And so that was the
23 basis for my original finding that was
24 identified as Finding 4.2-3.

25 In the meantime I guess you guys did

1 something else here. And this is a white
2 paper I take it that was issued here. And I
3 can conclude that your revised estimates, and
4 it's really defined mostly for environmental
5 onsite ambient exposure to radon. But I
6 wonder also to what extent it might just apply
7 to the K-65 workers themselves. Are we in a
8 position to even apply some of that data to
9 them?

10 I realize obviously it would come out
11 from the top and perhaps not necessarily
12 expose those workers who are in close
13 proximity to the silos. That's a question you
14 may want to look at at some other time. But
15 anyway, your white paper, I assume it's white
16 paper, a revised assessment, estimates, doses
17 or quantities, radon releases for 1988 or '89.
18 You have obviously very, very substantial
19 increase in number of curies that were,
20 certainly increased the number of curies
21 released from the original RAC 1995 data about
22 the 6,000 per year. So I'll let you respond
23 to what was done here.

24 **MR. ROLFES:** The radon model that we are
25 using now was based on research completed by

1 Susan Penny of the University of Cincinnati.
2 That took into consideration in addition to
3 the K-65 silos other potential source terms of
4 radon. And those included some of those
5 specific bins outside of the refinery, I
6 believe, in which the Q-11 ore was contained.
7 And I'd have to take a look back. It's been
8 awhile since I've looked at it, and it is a
9 large report. I believe much of this
10 information --

11 Mel, am I correct in saying that?

12 **MR. CHEW:** Uh-huh.

13 **MR. ROLFES:** Much of this information was
14 information that was used to revise the
15 environmental technical basis document.

16 **MR. CHEW:** Correct, uh-huh.

17 **MR. ROLFES:** Could you give us, you know, we
18 have updated our approach for environmental
19 intakes and provided a draft copy to the
20 Advisory Board for their review. This is not
21 a final approved version, and we did want to
22 provide this just to show that we have made
23 progress in this area to basically demonstrate
24 our progress on this issue. Once again, this
25 hasn't been finalized, and we will be

1 finalizing it.

2 **MR. CHEW:** Based on what you just said about
3 the, from your calculations the difference
4 between the Radium-226 and the Lead-210,
5 obviously looking at the emission data, we
6 probably need to go back and look at that TBD
7 and see if we can recalculate and address your
8 question here.

9 **DR. BEHLING:** Yeah --

10 **MR. CHEW:** Because right now with the way we
11 have it still in this draft form, was still
12 the information from the RAC data.

13 **MR. MORRIS:** Isn't it from the Penny data
14 that we've got in the ^?

15 **MR. CHEW:** Yeah.

16 **MR. MORRIS:** I think the report right now
17 reflects the Penny data.

18 **DR. BEHLING:** To me it would seem more
19 logical to go to first principles that says
20 what are we left with. What can we reasonably
21 conclude? It may be conservative. Obviously,
22 somebody had made a comment that you could
23 potentially lose Radon-222 in the walls as
24 it's seeping through, but gas follows the path
25 of least resistance.

1 And I would expect during the period
2 of time when there was no dome cap, then the
3 radon simply left through the top. And the
4 discrepancy between the Radium-226 and its
5 decayed daughter products would probably be a
6 more rational approach to saying the
7 difference is one of radon escaping into the
8 environment. And that requires very little
9 speculation and modeling or anything else.

10 It's a simple issue of defining the
11 disequilibrium between the Radium-226 that you
12 have empirical measurements for as well as
13 empirical measurements for the Lead-210 and
14 Polonium-210, and simply calculate it on the
15 basis of disequilibrium and assess what the
16 potential annual releases might have been.

17 **MR. RICH:** There was a period of time when
18 the cap was more secure than it was initially
19 which would, the radon would be contained more
20 and then the decay, then the Lead-210 in the
21 raffinate or in the solid could be less
22 because of the radon in Lead-210--

23 **DR. BEHLING:** It's like radon in your house.
24 People have always said if I could put a good
25 coat of paint on my floor, I should be able to

1 99 percent of radon. No, that's not the way
2 it works. A few cracks and that's all you've
3 got left.

4 **MR. RICH:** And I know we built an
5 underground whole body counter in Livermore
6 and surrounded it with about eight feet of
7 asbestos, low background fill. And the radon
8 in low pressure times went right through it,
9 but it doesn't take a lot to give you a lot of
10 activity.

11 **DR. BEHLING:** But what I'm saying is the cap
12 does not have to be an hermetically sealed cap
13 in order to preclude its escape. If it's even
14 moderately leaky, it's going to go out one way
15 or the other whether or not the cap is there
16 or it isn't. And so my gut feeling is --

17 **MR. RICH:** But there is a lot that decays in
18 place when there's a barrier of any kind so
19 when you say that the deficiency in Lead-210
20 is accounted for and everything escaping,
21 there is some that decays in --

22 **DR. BEHLING:** Oh, there's no doubt. And I'm
23 saying give the benefit of the doubt here and
24 use a conservative assumption that the
25 discrepancy is due to the escape. I realize

1 that. I realize that.

2 **MR. RICH:** But the principle's true. I
3 admit that you don't expect to come within ten
4 percent or so.

5 **DR. BEHLING:** And so I would just like to
6 see, mine was, you know, while I'm sitting at
7 my desk doing the back-of-the-envelope
8 calculations saying what's disequilibrium,
9 what should I expect to release on the basis
10 of the two radionuclides and the difference
11 between them. I think one was 60,000, and the
12 other one was 90,000 curies on an annual basis
13 as a rough estimate, you know, back-of-the-
14 envelope calculation.

15 **MR. CHEW:** There's an upper theoretical
16 bound.

17 **MR. GRIFFON:** So is there an action item?

18 **MR. ELLIOTT:** I think it's food for thought
19 as you develop the new draft here.

20 **MR. CHEW:** Okay, we'll take a look in
21 consideration of what your theoretical
22 calculation you're showing. But we're
23 focusing on the Penny data, right, Bob?

24 **MR. MORRIS:** That's my understanding.

25 **DR. BEHLING:** And that might be important

1 with regard to people who are onsite or near
2 the boundary for environmental, obviously, her
3 data, and I'm not going to dispute her, the
4 credibility of her research.

5 **RECAP OF ACTION ITEMS**

6 **MR. CLAWSON:** Well, we went ten minutes
7 over, but before we leave, Mark, if we could,
8 we need to have a review of what action items
9 we do have.

10 **MR. GRIFFON:** Going back to the first
11 finding, it comes under Finding 4.1-1. I have
12 a follow-up action. Here it is right now.
13 SC&A to review sample case along with default
14 of p^ (paren) one percent prior to 1964 and
15 two percent after '64 (closed paren). NIOSH
16 to provide documentation to support the
17 statement that most of the enriched material
18 was very slightly enriched (paren) slightly
19 greater then 0.71 percent U-235 (closed
20 paren).

21 I think there's more on that page.
22 And one more follow-up action on that same
23 finding. NIOSH will provide -- this is the
24 one we discussed right after lunch. NIOSH
25 will provide a response outlining their

1 approach for evaluating internal dose in cases
2 where uranium exposure may have caused
3 sufficient renal damage to affect the
4 biokinetic model.

5 And moving on to the next Finding 4.1-
6 2, SC&A to develop a protocol for validation
7 of HIS-20 urine data (paren) against the raw
8 records (closed paren). And we stopped at
9 developing the protocol because a lot of the
10 urine records aren't up there yet.

11 **DR. MAKHIJANI:** And by raw records you would
12 include the cards that we were talking about?

13 **MR. GRIFFON:** Yeah, these -- I forget the
14 exact name, but the, what are they called?
15 Not urine cards, there's some other term.
16 Anyway --

17 **DR. MAKHIJANI:** Bryce mentioned it.

18 **MR. RICH:** No, I think Mark did.

19 **MR. GRIFFON:** Oh, urine request cards I
20 think they were called.

21 Also, I think, I didn't write this one
22 down, but NIOSH will post additional urine
23 request cards --

24 **MR. ROLFES:** As they become available.

25 **MR. GRIFFON:** -- as available.

1 **DR. MAKHIJANI:** ^.

2 **MR. CLAWSON:** What?

3 **DR. MAKHIJANI:** ^ 50, 60 because that's how
4 we're going to proceed with them.

5 **MR. ROLFES:** Yeah, correct.

6 **MR. CHEW:** Didn't we discuss about putting
7 an upper bound on the number to look at them,
8 looking at part of the ^, a few hundred or
9 something like that?

10 **MR. GRIFFON:** Well, I think we, as far as
11 how many to sample, I mean, we said certainly
12 not 100 percent, but as long as you have a
13 representative number of logs. We're leaving
14 that up to you to define.

15 **DR. MAKHIJANI:** And I will talk to Harry to
16 see if he can develop it in the abstract or
17 whether he needs --

18 **MR. GRIFFON:** Right.

19 Then I have SC&A to review DR number
20 internal 14.

21 **DR. MAKHIJANI:** Isn't that the same as in
22 item one? I think, Mark, that's the same one.

23 **DR. BEHLING:** This is the dual thorium and
24 uranium bioassay.

25 **MR. GRIFFON:** You know, the reason I put

1 that in there was because we decided instead
2 of in progress, I'll just reference back to
3 4.1-1 because number four, NIOSH's response
4 said in progress, when actually we decided
5 we're not going to do any additional cases.
6 We're also going to review that one that's
7 already provided. I'm just going to put, see
8 4.1-1.

9 4.1-3, I have just NIOSH will do
10 additional follow up on this investigation
11 report that's related to those cases.

12 4.1-5, SC&A will review the white
13 paper -- and I think it is a white paper in
14 this case -- and supporting interview
15 information when available. And the second
16 part of that for 4.1-5, NIOSH has additional
17 raffinate air sampling data that is being put
18 into a spreadsheet format and will be provided
19 to the work group when completed. Stop me if
20 I did something incorrect there.

21 4.2-1, I did some editing of the NIOSH
22 responses, but I don't have to go through
23 those. Just that it wasn't really a white
24 paper but a section of the internal TKBS, et
25 cetera. The only action for 4.2-1 is that

1 NIOSH will further assess the apparent lack of
2 radon breath data after '54. And I left that
3 kind of open-ended. You can include the
4 urinalysis data or whatever.

5 4.2-3, the last --

6 **DR. MAKHIJANI:** Mark, is there something on
7 the question of the quality of the '52-to-'54
8 data that you want? Do you want to punt on
9 that and address it later or not an issue?

10 **MR. GRIFFON:** Well, I have this, since we
11 don't have the write up, I don't have anything
12 for you to review. I originally had it in
13 there, but I took it out because we don't have
14 that white paper. It's part of the overall
15 tech basis document, right? It's not a
16 separate paper.

17 **DR. MAKHIJANI:** Okay.

18 **MR. GRIFFON:** That's what I'm understanding.

19 **MR. MORRIS:** Don't you mean a TIB? I don't
20 think it's a --

21 **MR. GRIFFON:** Oh, I thought it was a site
22 profile basis.

23 **MR. SHARFI:** It is a site profile.

24 **MR. GRIFFON:** OTIB-0025, yeah.

25 **DR. MAKHIJANI:** So that will be out sooner

1 than this. That will presumably address this
2 issue?

3 **MR. GRIFFON:** Hopefully, if I'm
4 understanding Bryce correctly, you're going to
5 either release the entire site profile section
6 or, if not, maybe pull that part out and
7 provide it to us, right?

8 **MR. RICH:** Yeah.

9 **MR. GRIFFON:** You guys can --

10 **MR. RICH:** We need to talk about it.

11 **MR. GRIFFON:** So right now, Arjun, you know.

12 **DR. MAKHIJANI:** We'll hold off on that.

13 **MR. GRIFFON:** 4.2-3, NIOSH will consider
14 SC&A comments in updating the draft. That's
15 all I have for that, and that's regarding the
16 disequilibrium calculations.

17 And that's it. That's all I have.

18 Anybody have -

19 **MR. ROLFES:** Thank you, everyone.

20 **MR. PRESLEY:** Thank you, Mark.

21 **MR. CLAWSON:** We appreciate it.

22 **DR. ZIEMER:** Move adjournment.

23 **MR. CLAWSON:** Move we adjourn, moved and
24 seconded. Let's go.

25 (Whereupon, the work group meeting adjourned

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at 5:15 p.m.)

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CERTIFICATE OF COURT REPORTER**STATE OF GEORGIA****COUNTY OF FULTON**

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of October 24, 2007; and it is a true and accurate transcript of the testimony captioned herein.

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

WITNESS my hand and official seal this the 3rd day of May, 2008.

STEVEN RAY GREEN, CCR, CVR-CM, PNSC**CERTIFIED MERIT COURT REPORTER****CERTIFICATE NUMBER: A-2102**