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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)	Docket No. 72-22
)	ASLPB No. 97-732-02-ISFSI
PRIVATE FUEL STORAGE)	
L.L.C.)	TELEPHONE DEPOSITION OF:
)	
(Private Fuel Storage)	<u>EVERETT LEE REDMOND II</u>
Facility))	
)	(Utah Contention L, Part B)
)	

Thursday, November 15, 2001 - 8:15 a.m.

Location: Office of the Attorney General
160 East 300 South, 5th Floor
Salt Lake City, Utah

Reporter: Vicky McDaniel
Notary Public in and for the State of Utah



State's
Exhibit 137

50 South Main, Suite 920
Salt Lake City, Utah 84144

CLEAR REGULATORY COMMISSION

No. _____ Official Exh. No. 137
Letter of PKS
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WITHDRAWN _____
Date 6-25-03 Witness _____
pmj

PAGE 37 37

1 Q. Okay. And no involvement or contribution to
2 paragraph -- to items 2, 3, and 4 in paragraph 8?
3 A. No.
4 Q. Thank you. I'm going to go through a list
5 of some technical documents to see if you have reviewed
6 any of these documents or had any contribution to them.
7 A. Okay.
8 Q. The seismic analysis of the pads as done by
9 Stone and Webster?
10 A. No, I have not reviewed that.
11 Q. A Holtec report entitled Evaluation and
12 Confinement Integrity of a Loaded Holtec MPC under a
13 Postulated Drop Event?
14 A. No, I have not reviewed it.
15 Q. Dynamic Response of Freestanding HI-STORM
16 100 Excited by 10,000-year Return Period Earthquake at
17 PFS. That's another Holtec report.
18 A. No, I have not reviewed that.
19 Q. I believe this is your report, the Radiation
20 Shielding Analysis, right, of PFS?
21 A. That I have reviewed.
22 Q. Right. And finally, another Holtec report,
23 Multi Cask Response at the PFS ISFSI from a 2,000-year
24 Seismic Event?
25 A. No, I have not reviewed that.

PAGE 38 38

1 Q. Paragraph 10 of your declaration deals with
2 the geometry of the pad. Does this take into account
3 the new spacing that the PFS -- let me start that
4 again. PFS amended its license application this year
5 to show new spacing on the pad. Does the geometry that
6 you refer to take into account this new spacing?
7 A. Yes, it does.
8 Q. Did that have any effect on the dose
9 analysis, the new spacing?
10 A. Yes, it did. The dose analysis was redone
11 to account for the spacing.
12 Q. Did that end up -- if you know, did that end
13 up with a higher or lower dose analysis with the new
14 spacing as opposed to the old spacing?
15 A. I don't remember if it was higher or lower.
16 It was extremely close to the previous analysis is what
17 I remember.
18 Q. Okay. If you would turn to paragraph 22 of
19 the declaration. Mr. Gaukler may have told me this,
20 but I can't remember. There's no attribution to
21 paragraph 22.
22 A. Okay.
23 Q. Do you know who authored paragraph 22?
24 A. No, I do not.
25 MS. CHANCELLOR: If Mr. Gaukler knows, if

PAGE 39 39

1 you could tell me again.
2 MR. GAUKLER: I told you that Soler was
3 responsible for that.
4 MS. CHANCELLOR: I knew you did. I couldn't
5 remember.
6 Q. (BY MS. CHANCELLOR) If you would turn to
7 paragraph 23 of your declaration. Towards the end
8 of -- two thirds of the way down paragraph 23 you state
9 that there's a table in the PFS SAR that shows a
10 maximum value of 5.85 millirems per year was calculated
11 for a 2,000-hour year occupancy time.
12 A. Yes.
13 Q. At the controlled area boundary. Can you
14 explain to me why you used a 2,000-hour year?
15 A. Two thousand hours was used because it's
16 roughly equivalent to a 40-hour work week and the area
17 outside the controlled area of boundary is unoccupied,
18 and that was a conservative estimate for the amount of
19 time an individual would be spending there.
20 Q. You used the term "at the controlled area
21 boundary." I believe the regulations used "beyond the
22 controlled area boundary." Do you have an opinion
23 whether there's any difference between at the
24 controlled area boundary as opposed to beyond the
25 controlled area boundary?

PAGE 40 40

1 A. I don't have the regulations in front of me
2 to review them to know the exact wording, but to me
3 they would be the same.
4 Q. Have you done any dose calculations for an
5 8,760-hour year, which would be somebody at the
6 boundary 24 hours a day, 365 days for the entire year?
7 A. Not at the controlled area boundary. The
8 dose rate was estimated at the nearest occupant,
9 nearest resident for a full 8,760-hour occupancy time.
10 Q. What is the distance to the closest
11 resident?
12 A. I believe it's a mile and a half, or maybe
13 it's two and a half miles. I don't remember exactly.
14 Q. In your work with Trojan and Diablo, for
15 example, when you did dose calculations there, do you
16 know whether you used 2,000 hours per year at the
17 controlled area boundary or an 8,760-hour year?
18 A. Both of those analyses was done using not
19 2,000 hours but I believe 2,080 hours.
20 Q. So they didn't get any time off for
21 Christmas. Is that what you're saying?
22 A. Basically.
23 Q. Paragraph 25 of the joint declaration is
24 attributable both to you and to Dr. Soler.
25 A. Yes.

In the matter of: Private Fuel Storage
Everett Lee Redmond II * November 15, 2001

PAGE 45 45

1 Q. (BY MR. CHANCELLOR) Mr. Redmond, you stated
2 Hatch, Dresden, and then I didn't hear the rest of your
3 answer. Something about another utility.
4 A. Yes. We've manufactured casks for
5 Fitzpatrick. We have not manufactured casks for Diablo
6 Canyon or Trojan.
7 Q. Do you intend to, if you know?
8 A. We intend to manufacture casks for Diablo
9 Canyon. For Trojan, they have existing casks already.
10 Trojan is a unique situation. We will not be
11 manufacturing casks for them.
12 Q. Okay, thank you. You state that it's highly
13 unlikely that any localized crushing and associated
14 microcracking would create, quote, "uninterrupted
15 radiation streaming path." Does this statement imply
16 that the concrete has nowhere to go and that it
17 completely fills the steel walls?
18 A. Yes.
19 Q. Does your statement imply that the steel
20 cannot stretch under torsional movement?
21 MR. GAUKLER: Please restate the question.
22 I didn't hear that.
23 MS. CHANCELLOR: Does Mr. Everett's
24 statement about uninterrupted radiation streaming path,
25 does his statement imply that the steel cannot stretch

PAGE 46 46

1 under torsional movement.
2 A. It implies that it's my belief that the
3 steel will not stretch. It's my understanding that the
4 steel will not stretch.
5 Q. Have you done any calculations or do you
6 know of any calculations that have been done to support
7 that belief?
8 A. I have not done any calculations, and I'm
9 not familiar with the calculations that have been done.
10 Q. Have you done any calculations or do you
11 know of any calculations that have been done of the
12 radiation consequences of concrete cracking?
13 A. No.
14 Q. Have you considered concrete cracking such
15 that it would not provide radiation shielding?
16 MR. GAUKLER: Objection, vague and ambiguous
17 question.
18 Q. (BY MS. CHANCELLOR) If you understand the
19 question, you may answer it.
20 A. I don't actually understand the question.
21 Please rephrase.
22 Q. Have you looked at any concrete cracking
23 scenario where there would be a loss of radiation
24 shielding?
25 A. No, I have not analyzed any concrete

PAGE 47 47

1 cracking.
2 Q. If you would turn to paragraph 26 of your
3 declaration.
4 MR. GAUKLER: How much longer do you have,
5 Denise? We've been going about an hour and a half.
6 May be time for a break.
7 MS. CHANCELLOR: I think, Paul, I can wrap
8 it up -- I mean, if the witness is tired and would like
9 a break, that's just fine. But I really don't have a
10 whole lot more.
11 MR. GAUKLER: Do you want to take a break,
12 Everett?
13 THE WITNESS: If I could take about two
14 minutes, that would be great.
15 MS. CHANCELLOR: Yeah, that would be fine.
16 Why don't we call you back in five minutes, then.
17 (Recess from 9:32 to 9:49 a.m.)
18 MS. CHANCELLOR: Do you still have the same
19 people in the room?
20 MR. GAUKLER: Yeah.
21 Q. (BY MS. CHANCELLOR) Okay, where were we?
22 Welcome back, Mr. Redmond. If you would turn to
23 paragraph 26 of your declaration.
24 A. Okay.
25 MR. TURK: We're not on the record yet, are

PAGE 48 48

1 we?
2 MS. CHANCELLOR: Yes, we are.
3 MR. TURK: Could we go off one second?
4 MS. CHANCELLOR: Okay.
5 (Discussion off the record.)
6 Q. (BY MS. CHANCELLOR) Mr. Redmond, if you'd
7 look at paragraph 26 of your declaration.
8 A. Yes.
9 Q. Towards the end of the last sentence in
10 paragraph 26, the "therefore" clause, you talk about
11 the roundness of the storage cask could only be reduced
12 in the radial area of impact. Could you explain that
13 statement?
14 A. The analysis for the tipover, as I
15 understand it, indicates that any localized
16 deformations that might occur would occur between the
17 cask and the ground. And so what I'm talking about
18 here is if there's a localized deformation, the
19 roundness of the storage cask would be affected,
20 obviously, and that that only occurs between the cask
21 and the ground in that localized area. I'm defining
22 the area of impact, if you will.
23 Q. Now, I didn't -- my understanding was that
24 you hadn't reviewed the tipover analysis.
25 A. That's true, I haven't reviewed the tipover

In the matter of: Private Fuel Storage
Everett Lee Redmond II * November 15, 2001

SHEET 7 PAGE 49 49

1 analysis; but I have had discussions, like I've said
2 before, with Dr. Soler.
3 Q. Okay, and it's based on those discussions
4 that -- is this your contribution, the roundness of the
5 storage cask could only be reduced in the radial area
6 of impact?
7 A. Yes, it is. Well, yes. I wrote it, but
8 obviously Dr. Soler is on the paragraph as well.
9 Q. Just give me a moment. I've sort of lost my
10 train of thought. I'll only be a second.
11 On paragraph 28 you claim that if the casks
12 were lying on their sides, the side dose from a cask
13 would decrease and more than compensate the increased
14 dose from the top and bottom of the casks. Have you
15 done any calculations that support this claim?
16 A. I've done some very simplified calculations
17 to look at side dose from a tipped-over concrete
18 cylinder. I have not analyzed the HI-STORM 100 cask.
19 I have done some very simplified calculations, but I
20 have not looked at the top, any radiation coming off
21 the top or the bottom of the cask.
22 MS. CHANCELLOR: Mr. Gaukler, if we don't
23 have a copy of those calculations, could we get a copy?
24 MR. GAUKLER: Okay, I'll take it under
25 advisement.

PAGE 50 50

1 Q. (BY MS. CHANCELLOR) Have you estimated what
2 the dose on the bottom of the HI-STORM cylinder would
3 be in a tipover event, in a tipover event this side
4 would potentially be exposed and contribute to a dose
5 to someone at the boundary?
6 A. No, I have not.
7 Q. And in paragraph 28, the dose rate of the
8 controlled area of boundary, is that also based on the
9 2,000-hour year as it was in the early part in the
10 declaration?
11 A. Yes, it would be.
12 Q. In paragraphs 29 and 30 you basically look
13 at all 4,000 casks tipping over. Can you explain how
14 the tops and bottoms of the casks would be facing each
15 other, or, in other words, are they lined up on the
16 ground top to bottom?
17 A. I can try to explain it. This is my, again,
18 my opinion here. The Private Fuel Storage, this is
19 arranged in various rows of casks. Each pad has a --
20 well, as I discuss here in paragraph, well, 30, there 2
21 by 40 arrays of casks. So they're in basically rows of
22 80 casks, and then there's a pathway 35 feet wide
23 between them. The distance between the casks in that 2
24 by 40 array is 15 or 16 feet, depending on the
25 direction.

PAGE 51 51

1 And so the cask is better than 11 feet in
2 diameter, and so in order for the casks to fall over,
3 all 80 casks on a pad, they're essentially going to
4 have to fall away from each other. And if they fall
5 away from each other, you know, the tops of the casks
6 would then fall away from each other, and when they
7 land the bottoms would be facing each other.
8 Q. Why do you say that they would have to fall
9 away from each other?
10 A. Well, it's again my opinion that if you
11 wanted to have all 80 casks fall down and to be laying
12 on the ground flat, that's about the only way I can
13 think of that that would happen.
14 Q. Oh, so you're looking at the end result,
15 you're not looking at whether some would topple on top
16 of other casks?
17 A. Right. In fact, in paragraph 29 I talk
18 about that and say that, you know, in all likelihood
19 you wouldn't have all of them fall down. But paragraph
20 30 is talking about all 4,000 casks laying flat on the
21 ground.
22 Q. So is it your opinion that this would be the
23 worst case scenario if the casks were lying on the
24 ground top to bottom as opposed to at random some on
25 top of each other, some on their sides?

PAGE 52 52

1 A. I wouldn't use the word "worst case
2 scenario." As I say in here, my opinion is that the
3 end result of all 4,000 casks tipped over is
4 essentially no change in the dose rate.
5 Q. Provided that they're lying --
6 A. Well, and also --
7 Q. -- top to bottom?
8 A. -- the same would be true for casks being
9 randomly oriented and partially tipped over and some
10 upright.
11 Q. So your opinion is the same whether they
12 are -- whether they are lying top to bottom or whether
13 they are randomly distributed; is that correct? Is
14 that what you just said?
15 A. In the sense that if they're randomly
16 distributed, they're not all 4,000 lying down.
17 Q. Well, let's just say the 4,000 aren't all
18 upright.
19 A. Right. Well, if they're randomly
20 distributed, some of the casks would be upright, some
21 would be leaning against others, and others would be
22 laying down.
23 Q. So you wouldn't get the shielding from the
24 side of the cask like you would in the top to bottom
25 scenario if they were randomly distributed. Is that

In the matter of: Private Fuel Storage
Everett Lee Redmond II * November 15, 2001

SHEET 8 PAGE 57

57

1 the transportation license will not permit you to
2 transport the same contents that will be permitted for
3 storage in HI-STORM. In other words, the HI-STORM will
4 be permitted to store high burnup fuel. The
5 transportation license will be amended to store high
6 burnup fuel or to be able to transport high burnup
7 fuel. But the cooling time that will be permitted in
8 the transportation will be significantly longer than
9 will be permitted in the HI-STORM storage cask.

10 Q. So it will be higher burnup fuel with a
11 longer cooling time, but I'm not sure longer than what.

12 A. Well, longer than what will be permitted in
13 the HI-STORM storage cask.

14 Q. Okay, all right. Thank you. That clarifies
15 it.

16 I assume in paragraph 32 the radiation dose
17 at the site boundary is for the 2,000-hour years?

18 A. Just a second, please.

19 Q. Certainly.

20 A. Yes.

21 Q. Paragraph 33 of your declaration, you give
22 your opinion that a fully engulfing fire creating a
23 temperature of 1,475 degrees Fahrenheit for 3.6 minutes
24 at the surface of the storage cask would provide a more
25 severe thermal transient on the cask system with regard

PAGE 58

58

1 to shielding. Can you explain the basis of this
2 assumption?

3 A. I have to preface it by saying I'm not a
4 thermal expert, and again, this is my opinion. The
5 fire that was analyzed is 1,475, and I say here the
6 localized temperature excursion affects only 4 percent
7 of the total thickness, and therefore it's my opinion
8 that if you tip over the cask that the temperatures
9 that the concrete would see, I don't think they could
10 exceed the temperatures that have been calculated here
11 for the fire. Again, that's my opinion. I haven't
12 done any thermal analysis and I don't know what that
13 would show.

14 Q. Now, you say you're not a thermal expert,
15 but what are you basing your opinion on?

16 A. It's based on my feelings, actually, that in
17 a tipover situation the MPC would now be resting on the
18 inner portion of the overpack so there would be some
19 additional heat transfer mechanisms that are not
20 currently available in the HI-STORM overpack.

21 In addition, the heat load capability, or
22 the heat load that will be in the MPC at Private Fuel
23 Storage is far less than the heat load that the
24 HI-STORM is generically able to take, and that's
25 because of the transportation limitations we discussed

PAGE 59

59

1 earlier.

2 Based on those and the fact that the fire
3 also affects basically the entire cask, whereas in a
4 tipover condition if there's any effect on the concrete
5 it would be localized again, probably below the MPC,
6 not the whole body of the overpack. Based on those
7 viewpoints, that's what my opinion is based on.

8 Q. And you state that a 1,475 degree fire
9 condition, the 3.6 minutes would bound the thermal
10 events of cask tipover even if the casks remained in a
11 horizontal position for extended periods of time. Can
12 you describe the duration of extended periods of time?

13 A. The extended periods of time would be -- I
14 cannot give you a number for it, but if it takes a long
15 period of time to upright the cask, that would be an
16 extended period of time. I don't have a number for
17 you.

18 Q. Not even ballpark? Are we talking about
19 hours or days?

20 A. To me it would be probably tens of hours,
21 but I don't have a feel for it.

22 Q. Do you have an opinion on whether the
23 HI-STORM 100S provides better radiation shielding than
24 the HI-STORM 100?

25 MR. GAUKLER: Objection, lack of relevance.

PAGE 60

60

1 You can answer if you can.

2 A. The HI-STORM 100S has the same thickness,
3 same shielding in the radial direction as the HI-STORM
4 100. It is shorter, and therefore the dose rates out
5 the top of the overpack are somewhat higher on the
6 HI-STORM 100S than they are on the HI-STORM 100.

7 MS. CHANCELLOR: If you'd just hold on for a
8 moment, I think I'm about done. Let's go off the
9 record for a moment.

10 (Discussion off the record.)

11 Q. (BY MS. CHANCELLOR) I just have one more
12 question. Mr. Redmond, do you have an opinion of what
13 happens to concrete if the temperature is greater than
14 the design basis limits, both short-term limits and
15 long-term limits?

16 A. What would happen to concrete if --

17 Q. What would happen to the shielding
18 properties.

19 A. Right. If temperature is elevated for a
20 duration of time above -- I don't know the limits, the
21 temperature limits of concrete. I'm not a concrete
22 expert. But what would happen is the water that is in
23 the concrete would be driven out, and water has
24 hydrogen in it, so what you're doing is you're
25 decreasing neutron shielding when that happens, when

In the matter of: Private Fuel Storage
Everett Lee Redmond II * November 15, 2001

PAGE 61

61

1 the water's removed.

2 The gamma, the shielding properties of
3 concrete for gamma radiation are predominantly
4 unaffected because that's provided by the other
5 constituents in the concrete. So it's my opinion that
6 what would happen is that you would get an increase in
7 the neutron dose rate but really no significant change
8 in the gamma dose rate. And the gamma dose is the
9 dominant, by far the dominant portion of the radiation
10 dose coming off of the overpack, and therefore there
11 would be no significant change in the performance of
12 the overpack.

13 In addition, the localized areas, the
14 temperature increase would be localized areas. The
15 entire body of the overpack would not -- would not be
16 at the same temperature. There's still more gradients
17 through the overpack. So any increase in temperature
18 would be localized, which would further reduce the
19 shielding impact.

20 Q. Well, Mr. Redmond, thank you very much. I
21 have no further questions.

22 A. There's one thing that I was thinking I
23 should add in regards to the high burnup issue.

24 Q. Have you had discussion with counsel on this
25 issue?

PAGE 62

62

1 A. Only to the extent of --

2 MR. GAUKLER: Only to the extent we thought
3 clarification was appropriate.

4 THE WITNESS: And it was my idea.

5 Q. Okay, go ahead.

6 A. We had talked about the HI-STORM cask being
7 able to, in the amendment, take high burnup fuel. It
8 should be understood that as a general rule, the higher
9 burnup, longer cooling time fuel gives a lower dose
10 rate than shorter cooling time, lower burnup fuel. So
11 that means that even though the cask will be permitted
12 to store higher burnup fuel, that doesn't mean that,
13 necessarily mean that the dose rates would be higher
14 when you put that fuel in, because the permitted
15 cooling times for that fuel would also be longer.
16 That's the only point I wanted to clarify or add.

17 Q. Was there anything else you wanted to add or
18 clarify to your deposition?

19 A. No, that was it. That was something I
20 thought I left out. Thank you.

21 MS. CHANCELLOR: Okay, I have no further
22 questions.

23 MR. TURK: Paul, I would like to ask a
24 couple of questions. I don't know if this is something
25 that you're going to go into or not.

PAGE 63

63

1 MR. GAUKLER: I just have one question I'm
2 going to ask, so probably not.

3 EXAMINATION

4 BY MR. TURK:

5 Q. Okay. My name is Sherwin Turk. I'm an
6 attorney with the NRC staff. Mr. Redmond, I just want
7 to ask you a couple of questions. Is it Mister or
8 Doctor?

9 A. It's Doctor, actually.

10 Q. I apologize. I don't have your resume in
11 front of me.

12 A. No, that's quite all right.

13 Q. You were talking at some point about whether
14 Holtec is manufacturing the casks being used at other
15 sites.

16 A. Yes.

17 Q. When you used the phrase "manufacture," were
18 you including -- let me just ask you a direct question.
19 Is Holtec involved in the pouring of the concrete for
20 casks at any site? And if so, which site?

21 A. It's my understanding -- again, I'm not the
22 manufacturing person here -- our casks are -- the steel
23 portion of the cask is manufactured at U.S. Tool and
24 Dye. The casks are shipped then to the sites where the
25 concrete is poured. The concrete is poured, as I

PAGE 64

64

1 understand it, under supervision or observation, at
2 least, at a minimum by Holtec personnel using Holtec
3 approved procedures. Again, I'm not the manufacturing
4 person, so the final word on that would come from
5 somebody else. But that's my understanding. And I
6 believe that's been done at Dresden, Hatch and
7 Fitzpatrick. Those are the only sites we've delivered
8 casks to, HI-STORM casks to.

9 Q. Is that different in any way from your
10 understanding of what will be done at PFS?

11 MS. CHANCELLOR: Objection.

12 A. I have no reason to doubt it would be done
13 differently, but I don't know.

14 Q. Also you were asked some questions about the
15 hypothetical incident in which many casks or all casks
16 have been tipped over and are lying either on their
17 sides or some on their sides and some at a 45-degree
18 angle. Looking at that in a hypothetical situation
19 where there is a large amount of tipover casks, if a
20 cask is lying on the ground facing north-south and in
21 this orientation it's facing another cask that's lying
22 on its side facing east-west, that's oriented
23 east-west, would the north-south cask radiation be
24 shielded by that other cask that it's pointed at which
25 is lying in an east-west direction?