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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.	)	DEPOSITION OF:
	)	
(Private Fuel Storage	)	<u>PAUL J. TRUDEAU</u>
Facility)	)	
_____	)	(Utah Contention L/QQ)

March 6, 2002 - 1:06 p.m.

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

Reporter: Susette M. Snider, RPR, CRR  
Notary Public in and for the State of Utah



State's  
Exhibit 114

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GENERAL REGULATORY COMMISSION

Packet No. 72-22 Official Exh. No. 114  
in the matter of PPS

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Other _____	WITHDRAWN _____
DATE <u>5-8-02</u>	Witness _____
Clerk <u>amp</u>	

In the Matter of Private Fuel Storage  
Paul J. Trudeau \* March 6, 2002

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1 A. We would need to see the calc to find out  
2 for sure.  
3 Q. Okay. That's just fine.  
4 A. I could hazard a guess.  
5 Q. Sure, yes.  
6 MR. TRAVIESO-DIAZ: Do not guess.  
7 MS. CHANCELLOR: Yes, we'd love you to  
8 guess.  
9 MR. TRAVIESO-DIAZ: Instructing the witness  
10 not to guess.  
11 Q. (By Ms. Chancellor) Okay. I'll get those  
12 settlement calculations during the next break, and we  
13 can go over that.  
14 In your opinion will the dynamic forces  
15 imparted to the foundation and foundation soils include  
16 bending and torsional stresses?  
17 MR. TRAVIESO-DIAZ: Do you understand that  
18 question?  
19 THE WITNESS: This is with respect to the  
20 Canister Transfer Building foundation and the pads, I  
21 assume.  
22 Q. (By Ms. Chancellor) That's correct. The  
23 foundations that we're talking about in this  
24 contention. So if I mention foundations, unless I'm  
25 specific, it's either the pads --

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1 A. And the question is will those foundations  
2 be exposed to bending stresses due to the earthquake.  
3 Q. Bending and torsional stresses due to the  
4 dynamic forces from an earthquake, yes.  
5 A. In my opinion, that's likely, yes.  
6 Q. And have you performed calculations to  
7 determine the magnitude and orientation of these  
8 stresses?  
9 A. I have no need to do that. I'm not  
10 designing those structures. The structural designer  
11 needs to take those into consideration.  
12 Q. And is that the ICEC calcs?  
13 A. Yes, for the pads.  
14 Q. And what about the CTB?  
15 A. That would be one of Bruce Ebbeson's calcs,  
16 the structural -- the structural engineer in Cherry  
17 Hill.  
18 Q. Would that be the calculation,  
19 Development of Soil Impedance Function for the Canister  
20 Transfer Building, or Seismic Analysis of the CTB?  
21 There are two different calculations that Mr. Ebbeson  
22 was involved with --  
23 A. It's likely the latter.  
24 Q. The latter?  
25 A. I don't know for sure, but --

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1 Q. Okay.  
2 A. -- it's one of the SC calcs, probably 4 or  
3 5, but I'm not positive.  
4 Q. In your opinion will soil cement undergo  
5 bending and torsion also?  
6 A. Well, I believe it will be subjected to  
7 bending stresses. I'm not sure about the torsional  
8 stresses.  
9 Q. And why don't you think it will undergo any  
10 torsional stress?  
11 A. My opinion.  
12 Q. The soil cement testing program, will that  
13 be looking at all at bending stresses?  
14 A. No, not that I -- I don't consider that the  
15 bending stresses and the soil cement surrounding the  
16 pads are of any interest because that soil cement  
17 around the pads doesn't do anything for our design  
18 basis except enhance the sliding capability.  
19 Q. What about under the pads?  
20 A. Under the pads? Under the pads the  
21 material's going to be bonded to the concrete so --  
22 Q. Provided that your soil cement testing  
23 program shows that you can do that; is that correct?  
24 A. Correct.  
25 Q. So you're not going to look at the bending

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1 or torsional stresses in the cement-treated soil under  
2 the pad?  
3 A. Correct.  
4 (A discussion was held off the record.)  
5 Q. (By Ms. Chancellor) Will there be bending  
6 and/or torsional stresses in the soil cement around the  
7 CTB?  
8 A. Well, I believe there will be bending for  
9 sure. Again, not convinced where the torsional  
10 stresses are going to come from for that plate-like  
11 material around the building.  
12 Q. And what effect, if any, will these bending  
13 stresses have on the passive resistance of the soil  
14 cement around the CTB?  
15 A. I don't think they'll have any effect on  
16 it.  
17 Q. Why not?  
18 A. Why would they?  
19 Q. I'm asking you. You don't get to ask  
20 questions.  
21 MR. TRAVIESO-DIAZ: Well, I believe he  
22 said --  
23 MS. CHANCELLOR: I mean is there a basis  
24 for his opinion?  
25 Q. I mean is it just your gut feeling that

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1 that's what's going to happen or is there a basis for  
2 your opinion?  
3 A. If it -- if it bends in excess of the  
4 amount that it can tolerate, then it will crack, and if  
5 it cracks, it will be a vertical crack in response to  
6 this bending. As the waves pass through this material,  
7 if it cracks, it -- it's really not going to crack it,  
8 I don't think. It's going to end up opening an  
9 existing shrinkage crack. And when the wave goes by,  
10 the crack will be closed up again when the wave -- you  
11 know, when it's on the downside of it, it's going to  
12 close back up, and then when the waves fully pass,  
13 you're going to end up with the same kind of shrinkage  
14 crack you had when you began.

15 Now, the passive resistance is not  
16 diminished by the presence of a crack. It just means  
17 that the building needs to strain a little -- displace  
18 a little bit further to close up that little crack  
19 before you get the full resistance again. So I don't  
20 think that this bending stress issue is a concern for  
21 the soil cement surrounding the CTB.

22 Q. Well, how much can the CTB slide?

23 A. There is absolutely nothing safety related  
24 connected to this building, so it could slide tens of  
25 feet and it wouldn't affect any safety-related systems.

1 But certainly a few inches or even feet is not going to  
2 cause problems for safety of on-site or off-site  
3 personnel or the public.

4 This is -- this is a little different from  
5 normal nuclear power plant structures. On normal  
6 nuclear power plants, you have typically very  
7 Category I piping systems that you have to worry about  
8 being severed during an earthquake. So if the building  
9 were to slide, in a situation like that, you'd have to  
10 make sure that your connections were designed to  
11 sustain those kinds of movement. Here we don't have  
12 any Category I piping connections. We don't have any  
13 Category I electrical connections. We don't have any  
14 Category I gas lines or fuel lines or -- there's  
15 nothing Category I connected to this building, so if it  
16 were to slide a few inches it's not of any consequence  
17 to any safety-related thing.

18 (A discussion was held off the record.)

19 Q. (By Ms. Chancellor) In your opinion, is it  
20 possible that tensile strength of soil cement may be  
21 considerably less than that determined in unconfined or  
22 triaxial compression?

23 A. Would you please repeat the question?

24 Q. In your opinion, is it possible that  
25 tensile strength of soil cement may be considerably

1 less than that determined in unconfined or triaxial  
2 compression?

3 A. Yes.

4 MR. TRAVIESO-DIAZ: Sorry. I have problems  
5 with the form of the question. Two problems I have.  
6 First is what do you mean by tensile strength? You  
7 mean actual, in the actual condition, as opposed to  
8 test? That's my first question. And what do you mean  
9 by considerable? So I object to the form.

10 Q. (By Ms. Chancellor) Under test  
11 conditions -- well, just let's say less than rather  
12 than considerably.

13 A. Yes.

14 Q. How much? How much less?

15 A. I don't know.

16 Q. Let's see here. And when the state  
17 submitted its Contention Utah QQ, submitted a  
18 declaration by Dr. Mitchell, and in that declaration --  
19 and I'll give you a copy of it, but let me just read it  
20 for the record. In paragraph 11 of that declaration,  
21 Dr. Mitchell states, The cement-treated soil will be  
22 subject to tensile stresses from static loading, from  
23 freeze/thaw and wet/dry, from shrinkage and from  
24 dynamic loading. The tensile strength of  
25 cement-treated soil is typically only about a fifth to

1 a third of the unconfined compressive strength, so even  
2 rather low tensile stresses can cause cracking.

3 Here's the -- here's paragraph 11 of  
4 Dr. Mitchell's declaration. And I'd like to ask you  
5 whether you have an opinion on whether this range of  
6 tensile strength is possible?

7 A. I have no reason to doubt Dr. Mitchell's  
8 statement.

9 MR. TRAVIESO-DIAZ: I'm sorry. What -- I  
10 should have spoken sooner. What range are you talking  
11 about here?

12 MS. CHANCELLOR: The three to five times  
13 less than the unconfined compressive strength.

14 MR. TRAVIESO-DIAZ: Is that what you  
15 understood the question to be?

16 MS. CHANCELLOR: To the yellow highlighted  
17 area.

18 THE WITNESS: Um-hum.

19 MS. CHANCELLOR: And I asked him whether he  
20 had an opinion on whether this range of tensile  
21 strength is possible, and he -- Mr. Trudeau answered  
22 that he had no reason to challenge Dr. Mitchell's  
23 assumption.

24 Q. And my next question is if you do have this  
25 tensile strength being three to five times less than