

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of :  
 :  
PRIVATE FUEL STORAGE : Docket No. 72-22  
L.L.C. : ASLPB No. 97-732-02-ISFSI  
 :  
-----X

Washington, D.C.

Friday, March 15, 2002

Deposition of

JAMES K. MITCHELL

a witness, called for examination by counsel for Private Fuel Storage, pursuant to notice and agreement of counsel, beginning at approximately 8:30 a.m., at the law offices of Shaw Pittman, 2300 N Street, NW., Washington, D.C., before Barbara A. Huber of Beta Reporting & Videography Services, notary public in and for the District of Columbia, when were present on behalf of the respective parties:

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NUCLEAR REGULATORY COMMISSION

Docket No. \_\_\_\_\_ Official Exh No. \_\_\_\_\_  
In the matter of   PFS    
Staff \_\_\_\_\_ IDENTIFIED   
Applicant \_\_\_\_\_   
Intervenor \_\_\_\_\_   
Contractor's Off'r \_\_\_\_\_   
Contractor \_\_\_\_\_   
Other \_\_\_\_\_   
Reporter   JK

1 characteristic? Is that what you're saying?

2 A That's I think a reasonable way to  
3 put it. It's certainly possible to obtain a  
4 strength of 250 PSI. But to date, I have  
5 seen the results of -- I have not seen the  
6 results of any tests that show me that for  
7 this soil.

8 Q Again, I'm jumping way ahead, but  
9 we my go back to this. I provided to the  
10 state at their request earlier this week  
11 some preliminary test results of the program  
12 that PFS is conducting.

13 Have you seen those?

14 A Yes.

15 Q So you have seen those test  
16 results?

17 A I have.

18 Q Going back --

19 A That is, if it's the same set of  
20 results -- you know, there may -- I don't  
21 know how many sets of results there are, but  
22 I have seen one set of results.

1 report on soil cement in developing the site  
2 specific procedures for mixed portion and  
3 testing, construction and quality control?

4 A I'd have to go back and look at  
5 the guidelines in some detail to be sure  
6 whether you would follow them exactly in all  
7 respects. But I think that there's good  
8 guidance there, yes. The same kind of  
9 guidance are available through the Portland  
10 Cement Association publications and  
11 elsewhere.

12 Q Is it, in fact, your understanding  
13 that the state-of-the-art report on soil  
14 cement references all the publications, such  
15 as the Portland cement standard that you  
16 talked about?

17 A I think it does. References the  
18 AFTM standards that are often used.

19 Q Those would be the standards that  
20 you would expect somebody designing or  
21 constructing soil cement probably would be  
22 follow; is that correct?

1           A     Yes, I believe so. Yes, I would.

2           Q     As long as we are on that  
3     page, 26117, would you take a look at the  
4     discussion we just began looking? Take a  
5     second to read that, or more than a second.  
6     I would like you to take a look at that  
7     paragraph on page 26117, and then three  
8     paragraphs with bullets that go on  
9     page 26118 and 119. Take a second to review  
10    those. Let me know when you're finished.

11          A     Okay.

12          Q     Before we go into the specifics of  
13    this bullets, maybe it would be good for the  
14    record if we talked about your understanding  
15    of what PFS intends to do with soil cement.

16                 Are you sufficiently familiar with  
17    what you understand to be their intents, so  
18    you can describe it for us?

19          A     Do you want me to describe it?

20          Q     Yes. If you could describe your  
21    understanding of what they're trying to do.

22          A     They're using it in two ways, my

1 strengths of mixes, if you will, of soil  
2 cement underneath the pad, as opposed to  
3 elsewhere; is that correct?

4 A Yes.

5 Q So what is your understanding of  
6 the compressive strength, if you will, of  
7 soil cement that they want to use underneath  
8 the pads, as opposed to in other areas?

9 A My understanding if -- is that the  
10 strength of the treated soil beneath the  
11 pads is low. Is 40 PSI right, the right  
12 number? That the soil cement surrounding  
13 the building is stronger, 250 PSI.

14 Q The soil cement around the pads is  
15 also stronger?

16 A I don't remember on that but I --  
17 I don't remember whether it's still the 40  
18 or whether it's 250.

19 Q With that background, let's turn  
20 to the first bullet on page 26118.

21 In that paragraph, with the first  
22 bullet that is entitled, soil/cement mix and

1 procedure development, the first paragraph  
2 of that entire section says, The sliding  
3 forces due to design bases ground motion  
4 will be resisted by bond between the base  
5 and sides of the foundation and the soil  
6 cement, and by passive resistance of the  
7 soil cement acting against the vertical side  
8 of the foundation. The soil cement mix will  
9 be designed and constructed to exceed the  
10 minimum shear resistance requirements.

11 Do you have any reason to believe  
12 that this approach as a technical  
13 proposition will not be successful if done  
14 properly?

15 A I don't have any reason to believe  
16 that it wouldn't be successful, no.

17 Q It goes on to say that there be  
18 direct shear testing conducted to replicate  
19 the soil conditions and to confirm the  
20 adequate shear resisting and other strength  
21 requirements will be provided by the final  
22 soil cement mix.

1           A     My response to that is that's  
2     important, yes.

3           Q     Isn't it true that if PFS performs  
4     durability tests as specified in Exhibit 14  
5     that demonstrate that the mix that they  
6     propose to use passes or survives these  
7     durability tests, that that mixture would be  
8     qualified, in your opinion, as true soil  
9     cement?

10          A     Yes.

11          Q     If it doesn't, therefore it  
12     doesn't qualify as such?

13          A     It would not.

14          Q     But that's independent of whether  
15     the mixture that they intend to use achieves  
16     the strength that is specified?

17          A     Yes.

18          Q     You testified earlier that you see  
19     no problem with the ability to get the 250  
20     PSI mix as such?

21          A     My opinion is that it should be  
22     possible, but I would like to see it

1 demonstrated.

2 Q Also you would like to see  
3 demonstrated that in addition to having 250  
4 PSI, it meets the durability test?

5 A That's correct.

6 Q Let's move to paragraph 13 in your  
7 declaration.

8 It starts with, It is not  
9 surprising that no site specific testing has  
10 been done to date to obtain the strength and  
11 durability properties of the cement-treated  
12 soil.

13 Do you see that?

14 A I see that. But what I heard I  
15 don't believe is what I said.

16 Q Did I misread it?

17 A I believe you said it is not  
18 surprising. It's an important distinction.  
19 Because I said it is surprising.

20 Q If I did that, it was a Freudian  
21 slip, as they call it.

22 What I'm asking you, actually,

1 some thermal studies that would tell us.

2 Q If, in fact, there was some heat  
3 that was being moved downwards by the  
4 mechanism that we just described, then would  
5 that heat tend to move the moisture away the  
6 top layer or towards the top layer?

7 A I would expect it to move it away.  
8 I'd be very interested in seeing the thermal  
9 results of this. It's an interesting issue.

10 Q Of course, this is not something  
11 that you have analyzed to date?

12 A I have not analyzed. But I have,  
13 in the past, done both experimental and  
14 theoretical research on the heat flow around  
15 buried things.

16 Q This mechanism that I described to  
17 you is one that you have reason to believe  
18 its possible, or at least it's --

19 A Well, the heat transfer and the  
20 temperature. Oh, yes.

21 Q Now, let's go back to  
22 paragraph 14. Because I think in addition

1 Q What will your comments be on that  
2 particular issue?

3 A Well, we have no data to  
4 demonstrate what the modulus is at this  
5 point. If the material is a soil cement, I  
6 would be seriously concerned about whether  
7 the modulus could ever be that low. That's  
8 a very low value for soil cement.

9 But, also, as I think I understand  
10 it now, the rules of the game have changed a  
11 little bit since I first did this. The  
12 material beneath the pads will not  
13 necessarily be a soil cement. It will be a  
14 cement-treated soil.

15 I think at this point it's a  
16 question of: All right. For the cement  
17 treatment that you're now going to use or  
18 it's being proposed for use, will the  
19 modulus be within that design limit? To  
20 that question, I have no answer. Because I  
21 don't see any data.

22 Q Let's talk about that question.

1                   First, as a technical engineering  
2 matter, is it within what is achievable,  
3 given the state-of-the-art, to build a  
4 cement-treated soil moisture will that have  
5 a Youngs modulus of 75,000 PSI or less?

6                   A     I can only say it potentially is.  
7 But it's going to be an issue of how much  
8 cement for this soil and what placement  
9 condition. Because the placement condition  
10 can be tremendously important in determining  
11 the strength and stiffness, as well as the  
12 cement content. It's at the low end of  
13 modulus values for this kind of a material,  
14 where we just don't have much data.

15                   I was looking at information on  
16 this, and trying to see do we have good data  
17 points down in that modulus range. That's  
18 about where you go off the chart.

19                   Q     Now, assuming that, in fact, the  
20 design intent is carried out to have  
21 cement-treated soil with a strength of 40  
22 PSI, do you believe that that's in the range

1 of values that, subject to proven by  
2 testing, could yield a modulus of 70,000 PSI  
3 or less?

4 A I think it is potentially  
5 possible. I'm trying to remember a number.  
6 I think it might be in that ACI report,  
7 about modulus value is a function of cement  
8 content for fine grain soils. It's way down  
9 in the lower left corner.

10 Q How would you go, first of all,  
11 about testing the soil, the cement-treated  
12 soil mixture that you intend to use, to  
13 determine whether it meets the upper bound  
14 limitations of the Youngs modulus? What  
15 kind of test would you expected that would  
16 be performed?

17 A I think the -- I would test soil  
18 from the site over a range of proposed  
19 cement and water contents. I would have  
20 specimens -- cured specimens, for which I  
21 could determine both the strength and the  
22 modulus.

1                   There are different ways that you  
2                   can get the modulus: From strength test,  
3                   from some dynamic tests that are possible.  
4                   Then you simply -- you have to find a  
5                   condition that will give you this strength,  
6                   which is 40 PSI compressor strength; and for  
7                   those materials, what range of conditions  
8                   will give you a modulus that is less  
9                   than 75,000 PSI.

10                  Q           That would you determine through a  
11                  testing program under the lines that you  
12                  talked about?

13                  A           Testing program, yes.

14                  Q           Now, as to the second part --  
15                  which I thought that you mentioned as being  
16                  pretty important -- what do you mean by  
17                  placement conditions?

18                  What is it that you would like to  
19                  see in order to assure yourself that even if  
20                  you have been able to through testing to  
21                  determine that you have a cement-treated  
22                  soil mix that emits a 75,000 PSI limit, what

1 surrounding field, the strain will be  
2 considerably less. So a comprehensive  
3 response of all that would have to take all  
4 that into account.

5 Q Fair enough. Let me ask you a  
6 more general question. We have been talking  
7 about the various issues that you have  
8 identified in your declaration, and in  
9 subsections C and D of Contention QQ,  
10 subsection C and D of part C of Contention  
11 QQ.

12 Would it be fair to characterize  
13 your responses as indicating that many of  
14 these issues are in the nature of things  
15 that you would like to see proved through  
16 testing, as opposed to being unachievable  
17 technically?

18 A Yes.

19 MR. TRAVIESO-DIAZ: I have nothing  
20 else.

21 MR. TURK: I may have none, or  
22 very, very little.