

CONDENSED TRANSCRIPT

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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
PRIVATE FUEL STORAGE) ASLPB No. 97-732-02-ISFSI
L.L.C.) TELEPHONE DEPOSITION OF:
)
(Private Fuel Storage) <u>KRISHNA P. SINGH</u> and
Facility)) <u>ALAN I. SOLER</u>
)
) (Utah Contention L, Part B)

VOLUME I

Thursday, November 15, 2001 - 2:19 p.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 121



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1 CLEAR REGULATORY COMMISSION

Docket No. Official Exh. No. 121
In the matter of PKS
Staff IDENTIFIED ✓
Applicant RECEIVED ✓
Intervenor ✓ REJECTED
Other WITHDRAWN
DATE 5/7/02 Witness
Clerk V. Richard

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VOLUME II

Friday, November 16, 2001 - 11:26 a.m.

Location: Office of the Attorney General
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1 process, Bob Youngs. So I'd say there was only one
2 person I talked to.

3 Q. Thank you. And who at Stone and Webster
4 have you had discussions with?

5 A. (DR. SOLER) Oh, let's see. John Donnell,
6 Jerry Cooper, Stan Macy, Paul Trudeau up in the Boston
7 office, and a couple of people in the Cherry Hill
8 office, Mr. Ebbeson. I don't believe I've missed
9 anybody, but there have been so many people over the
10 years, I might have. But those are the ones that come
11 to mind. Oh, and wait a minute. I guess I've had a
12 conversation with Dr. Wen Tseng having to do with the
13 input that I gave him for the pad analysis.

14 Q. Okay, thank you. Who is your current
15 employer?

16 A. (DR. SOLER) Holtec International.

17 Q. And what is your position?

18 A. (DR. SOLER) Executive vice president and
19 vice president of engineering.

20 Q. And what are your duties?

21 A. (DR. SOLER) Oversee the entire engineering
22 staff in general, and specifically have direct charge
23 of the people doing structural and seismic analysis.

24 Q. And now if you'll look at your resume.

25 A. (DR. SOLER) Okay.

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1 Q. If you'll review your resume, take a moment
2 to review your resume. Could you tell me if it's
3 current?

4 A. (DR. SOLER) I would say -- let me just take
5 a look at the last item on it. I would say it's a
6 couple of years out of date. There's no date on here
7 saying when it was last updated, but I don't recall
8 updating it in the near past.

9 Q. Is there any experience or publications that
10 is particularly relevant to Utah Contention L, Part B
11 that's not on your resume?

12 A. (DR. SOLER) Yes. There is a publication,
13 actually it was a presentation that was given at the
14 recent Structural Mechanics and Reactor Technology
15 Conference in Washington, D.C.

16 Q. And what was the subject of this
17 presentation?

18 A. (DR. SOLER) Basically dry storage casks and
19 their behavior during seismic events.

20 MS. NAKAHARA: And Paul, I'd request a copy,
21 to the extent he has one, of his presentation.

22 MR. GAUKLER: Okay.

23 Q. (BY MS. NAKAHARA) Dr. Soler, if you'll look
24 on page 2 of your resume in the section entitled Dry
25 Spent Fuel Storage Technology. And you have from 1992

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1 to present you're the lead analyst in mechanical/
2 seismic/structural analysis, and I presume that was
3 your description in describing your duties?

4 A. (DR. SOLER) That's correct.

5 Q. What does METCON stand for?

6 A. (DR. SOLER) That's just an acronym for
7 metal/concrete construction.

8 Q. And have you conducted site-specific seismic
9 analyses that estimate the probability of cask failure
10 for sites other than PFS?

11 MR. GAUKLER: Objection. What do you mean
12 by cask failure?

13 Q. Let me rephrase. Have you conducted
14 site-specific cask stability analysis from seismic
15 ground motion for facilities other than the PFS
16 facility?

17 A. (DR. SOLER) Yes, I have.

18 Q. For which sites, or for which --

19 A. (DR. SOLER) For Diablo Canyon, some scoping
20 work for Humboldt Bay, some work for Energtgy Northwest,
21 and for -- let's see. Did we do -- I believe that we
22 did some for Dresden and for the Tennessee Valley
23 Authority.

24 Q. For the analysis at Diablo Canyon, is this
25 for the anchored HI-STORM 100S cask?

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1 A. (DR. SOLER) Yes, it is.

2 Q. Do you recall the ground motion at Diablo
3 Canyon?

4 A. (DR. SOLER) In what way?

5 Q. The ground motion that you estimated, or you
6 performed your cask stability analysis.

7 A. (DR. SOLER) I recall specifically the
8 general level of the zero period accelerations, if
9 that's what you're asking me.

10 Q. Yes.

11 A. (DR. SOLER) There are a number of
12 excitations provided to us.

13 Q. Approximately when was the ground motion of
14 the zero period acceleration?

15 A. (DR. SOLER) Between .9 and 1.

16 Q. For what earthquake magnitude is a zero
17 period acceleration at Diablo Canyon?

18 A. (DR. SOLER) I think that's what I just gave
19 you. I mean, it's not a -- what do you mean by
20 earthquake magnitude?

21 Q. Local Richter.

22 A. (DR. SOLER) I don't know the answer to that
23 one.

24 Q. And approximately what time period did you
25 prepare the Diablo Canyon analysis?

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1 A. (DR. SOLER) Over the period September 2000
2 to essentially September 2001.
3 MS. NAKAHARA: Can we get a copy of this
4 analysis?
5 MR. GAUKLER: I'll take it under advisement.
6 Q. (BY MS. NAKAHARA) The scoping for Humboldt
7 Bay, approximately what period did you do the scoping?
8 A. (DR. SOLER) I can't honestly recall the
9 dates without leaving the room, I guess.
10 Q. That's fine. Was this for a HI-STORM 100
11 cask or a 100S cask?
12 A. (DR. SOLER) It was not.
13 Q. The Entergy Northwest, what type of cask
14 system did you analyze there?
15 A. (DR. SOLER) That was a 100S.
16 Q. And where is the Entergy Northwest facility
17 located?
18 A. (DR. SOLER) Richland, Washington.
19 Q. And what were the zero period accelerations
20 that you looked at in that analysis?
21 A. (DR. SOLER) Outside the building, I
22 believe -- I'd just better not say, because I'm
23 guessing. But it was not as large as what I quoted you
24 for Diablo Canyon.
25 MS. NAKAHARA: We'd like a copy of that

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1 analysis also.
2 MR. GAUKLER: I'll take it under advisement.
3 Q. (BY MS. NAKAHARA) And for the Dresden
4 facility, what type of zero period accelerations did
5 you use there?
6 A. (DR. SOLER) They were very low, about 0.2.
7 Q. Okay. And the Tennessee Valley facility,
8 what type of zero period accelerations did you use?
9 A. (DR. SOLER) In the neighborhood of .5 to
10 .6.
11 Q. And what type of cask system is at the
12 Tennessee Valley facility?
13 A. (DR. SOLER) A 100S.
14 MS. NAKAHARA: And we'd like a copy of that
15 analysis also.
16 MR. GAUKLER: I'll take it under advisement.
17 Q. (BY MS. NAKAHARA) If you'll look at your
18 resume and turn to page 6. And listed as publication
19 47 -- oh, strike that. I asked Dr. Singh about this
20 one.
21 If you'll look at page 7. Item publication
22 50 entitled Foundation Stresses Under Support of
23 Freestanding Equipment Subjected to External Loads.
24 Will you generally describe this publication, the
25 subject of this -- not the subject. What's in this

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1 publication?
2 A. (DR. SOLER) Well, it had nothing to do with
3 dry storage casks. It dealt with heat exchanger
4 foundations, and the external loads were a combination
5 of piping and seismic loads. But it was dealing with
6 determining the stresses in the foundation of a heat
7 exchanger.
8 Q. Would the principles applied to heat
9 exchanger foundation be similar to that of a dry cask
10 storage system?
11 A. (DR. SOLER) Not really. The shape was
12 specific to heat exchangers, for the most part. I
13 mean, if you look at the date, 1985, that was well
14 before dry storage entered my thinking.
15 MS. NAKAHARA: I asked for this document
16 earlier, Mr. Gaukler. I'd still request that we get a
17 copy of this.
18 MR. GAUKLER: Okay.
19 Q. (BY MS. NAKAHARA) And then Dr. Soler, if
20 you'll look at publication No. 57 on page 7 entitled
21 Some Results from Simultaneous Seismic Simulations of
22 All Racks in a Fuel Pool. Will you describe this
23 publication in general terms?
24 A. (DR. SOLER) That was an analysis of a
25 series of spent fuel racks considered immersed in water

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1 in a fuel pool and subject to a hypothetical seismic
2 excitation. It was not specific to any plan.
3 MS. NAKAHARA: Okay. And we'd request this
4 document also.
5 MR. GAUKLER: Okay.
6 Q. (BY MS. NAKAHARA) And then if you'll look
7 at publication 59, Seismic Response Characteristics of
8 HI-STAR 100 Cask System on Storage Pads. Dr. Soler,
9 will you generally describe what's in this publication?
10 A. (DR. SOLER) This was basically an early
11 work that we did for Pacific Gas and Electric to simply
12 evaluate our initial attempts at anchoring casks, and
13 at that time we were looking at the HI-STAR 100 cask
14 system. It was a paper that was written.
15 MS. NAKAHARA: Okay. And we still request a
16 copy of this document.
17 MR. GAUKLER: Okay.
18 Q. (BY MS. NAKAHARA) Dr. Soler, are you
19 familiar with NRC's Rulemaking Plan SECY 98-126, which
20 was published approximately in -- obviously 1998? And
21 I apologize for not having a copy for you to look at.
22 A. (DR. SOLER) The answer is no.
23 Q. Are you familiar with Exhibit 12 of the
24 deposition exhibits? If Paul would get you a copy of
25 that.

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1 describing your cask stability analysis, you mentioned
2 that you used a lump mass model of the system.

3 A. (DR. SOLER) Yes.

4 Q. Have you, for the PFS case or any previous
5 case in which you used the same model for a HI-STORM
6 100 cask, have you calibrated that model with any test
7 data?

8 A. (DR. SOLER) Only against classical
9 solutions. I would not say -- certain aspects of the
10 model have been calibrated against test data in the wet
11 storage arena, but in general the program has been
12 validated by comparing against other solutions which
13 have the same characteristics.

14 Q. And do I recall correctly that you compared
15 your model solutions to ANSYS, or am I not recalling
16 correctly?

17 A. (DR. SOLER) I believe at one stage of the
18 development of the algorithm a portion of the model for
19 a specific job was compared against a similar model
20 from ANSYS, although the comparison was not made on
21 racks or casks, it was made on a problem that was
22 developed simply for the purposes of making the
23 comparison.

24 Q. To the extent you recall, what other models
25 were compared to the lump mass model used in the PFS

1 arena, did those codes have any actual test data in
2 which they were calibrated, to the extent you know?

3 A. (DR. SOLER) I would not know one way or the
4 other, although at least in one case where a simple
5 code was used as part of a thesis of the university, I
6 believe that there was some testing of the results of
7 that code against an experimental model.

8 Q. Do you have any, does Holtec have any test
9 data which shows the HI-STORM 100's ability to
10 withstand ground motion?

11 A. (DR. SOLER) No.

12 Q. And is it correct that you also -- this
13 would encompass any bench scale test data?

14 A. (DR. SOLER) The answer would be still no.

15 MS. NAKAHARA: Okay, thank you.

16 We've been going probably less than 30
17 minutes, but if you're willing to take a perhaps a
18 longer break, a 30-minute break, I think I can make
19 this go a little faster.

20 MR. GAUKLER: Okay.

21 MS. NAKAHARA: Actually, how about if I call
22 you back at four o'clock your time? Is that convenient
23 for you, Mr. O'Neill?

24 MR. O'NEILL: That's fine.

25 MS. NAKAHARA: Thank you. I suspect I have

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1 analysis?

2 MR. GAUKLER: Objection, vague and ambiguous
3 question.

4 Q. Dr. Soler, do you understand the question?
5 You indicated that you compared other models to the
6 lump mass model you referred to earlier in the PFS cask
7 stability analysis.

8 A. (DR. SOLER) No, no. What I stated was that
9 the entire, the computer codes that we used for PFS has
10 been used previously in dry storage submittals in the
11 recent past, and in the near and distant past it's been
12 used in wet storage applications. And in the course of
13 applications before the NRC in wet storage, we did some
14 comparisons of the predictions of our program with the
15 predictions of other programs the course of validating
16 our code. It was not specifically comparing a wet
17 storage analysis by our code with a wet storage
18 analysis by another code.

19 Q. Okay.

20 A. (DR. SOLER) Simply pick a problem that had
21 a well-known solution or had been done by another
22 analyst using another code and compare it with what we
23 would get using our code.

24 Q. Okay, thank you for the clarification. Did
25 the other codes that you compared in the wet storage

1 less than an hour of questions.

2 MR. O'NEILL: Dr. Soler, or all together?

3 MS. NAKAHARA: All together.

4 (Lunch recess from 1:27 to 2:06 p.m.)

5 Q. (BY MS. NAKAHARA) We are reconvening the
6 deposition of Dr. Alan Soler and Dr. Krishna Singh, and
7 Dr. Singh has now joined us. Is that correct?

8 A. (DR. SINGH) That is correct. This is Chris
9 Singh.

10 MS. NAKAHARA: And I think Paul, Mr. Gaukler
11 wanted to go on the record attributing a paragraph in
12 the declaration to Mr. Singh, and I'll let Paul do
13 that.

14 MR. GAUKLER: I want to go on the record to
15 say that he will be testifying to paragraph 33 that's
16 in the declaration, talking about the degradation of
17 concrete due to heat transfer in a tipover condition.

18 And I want to clarify one other point. I
19 had thought that paragraph No. 22, which we didn't have
20 anybody to identify, would be Alan Soler separately.
21 It will be Alan Soler and Chris Singh, paragraph 22.

22 Q. (BY MS. NAKAHARA) Dr. Soler, are you
23 familiar with the location of faults near the proposed
24 PFS site as described in Geomatrix's seismic hazard
25 assessment?

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1 A. (DR. SOLER) No, other than the limited
2 reading I gave it four years ago, five years ago.
3 Q. Are you aware that a major fault capable of
4 generating a 6.5 magnitude earthquake could impact the
5 PFS site?
6 A. (DR. SOLER) That sounds like a two-part
7 question to me. Am I aware?
8 Q. Yes. Are you aware that a major fault
9 capable of generating a 6.5 magnitude earthquake could
10 impact the PFS site?
11 A. (DR. SOLER) I am not aware of it.
12 Q. Are you familiar with the term "near fault
13 effects" for earthquakes?
14 A. (DR. SOLER) Not really.
15 Q. Then is it fair to say that you did not
16 consider near fault effects in your cask stability
17 analysis for the HI-STORM 100 at the PFS site?
18 MR. GAUKLER: Objection. There is no basis
19 for him to say whether he knew whether he did or
20 whether he didn't.
21 Q. (BY MS. NAKAHARA) Did you --
22 MR. GAUKLER: He's already described that he
23 got input through Geomatrix.
24 Q. (BY MS. NAKAHARA) Did you consider near
25 fault effects, to the extent you know, in the cask

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1 stability analysis for the HI-STORM 100 at the PFS site
2 for a 2,000-year return period?
3 MR. GAUKLER: Same objection on 2,000-year.
4 A. (DR. SOLER) I considered the earthquakes
5 that were given to me. The basis for those earthquake
6 time histories I'm not familiar with.
7 Q. And will you clarify, did you calculate the
8 design-basis ground motion yourself or rely on
9 Geomatrix? You told me what you received, but I guess
10 I don't quite understand.
11 A. (DR. SOLER) The original deterministic
12 earthquake, we received the response spectra and we
13 computed the time history from that response spectra.
14 For all of the other earthquakes we received the time
15 history directly.
16 Q. Directly from Geomatrix?
17 A. (DR. SOLER) Correct.
18 Q. Okay, thank you. In your opinion, would
19 earthquake waves arriving at an angle to the HI-STORM
20 100 cask, would it would it cause additional rocking
21 and torsional motion than if it approached
22 perpendicularly?
23 MR. GAUKLER: Object to the form of the
24 question. You can answer if you can.
25 A. (DR. SOLER) I'm not an expert in that area.

1 That was my answer.
2 Q. No, I'm sorry. I'm skipping over questions
3 that were related to that. I'm sorry. I should have
4 told you that.
5 In your analysis HI-2012640 -- I'm sorry, I
6 don't have a title. Do you know which report I'm
7 referring to?
8 A. (DR. SOLER) Yes, I've got it in front of
9 me. Multi-cask Response at PFS ISFSI from 2,000-year
10 Seismic Event, Rev 2.
11 Q. Thank you. What is the maximum weight of a
12 single HI-STORM cask loaded with fuel assemblies used
13 in that report?
14 A. (DR. SOLER) 360,000 pounds.
15 Q. And did you consider a minimum weight in
16 that report?
17 A. (DR. SOLER) No, we considered one weight.
18 Q. With respect to your cask stability analysis
19 for a 10,000-year return period, Holtec report No.
20 HI-2012780, did you use the same maximum weight that
21 you used in the previous report for a single HI-STORM
22 cask loaded with fuel assemblies?
23 A. (DR. SOLER) Yes.
24 Q. Back to the 2,000-year report, HI-2012640,
25 did you use values for alpha damping co-efficients in

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1 code MR2V181.EXE for dynamic simulation?
2 A. (DR. SOLER) No.
3 Q. Did you use values of beta damping for the
4 same code for dynamic simulation?
5 A. (DR. SOLER) Yes.
6 Q. What beta value did you use?
7 A. (DR. SOLER) That number appropriate to 5
8 percent damping.
9 Q. And with respect to the 2,000-year cask
10 stability analysis HI-2012640, what mathematical model
11 of a single cask was used?
12 A. (DR. SOLER) A lump mass mathematical model.
13 Q. And I'm sorry for not recognizing that
14 earlier in your earlier statement.
15 In the 2,000-year cask stability analysis
16 HI-2012640, did you consider any pad-to-pad interaction
17 forces in the cask stability analysis?
18 A. (DR. SOLER) No.
19 Q. Do you believe they would impact the cask
20 stability?
21 A. (DR. SOLER) No.
22 Q. And why not?
23 A. (DR. SOLER) Because we took a conservative
24 approach that there was nothing surrounding the pad we
25 were looking at. If there was any additional