RAS 5580 72-22-ISFSI -State Exhibit 121- Rec'd 5/7/02

CONDENSED TRANSCRIPT

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 Facility)	) **KRISHNA P. SINGH** and
	) **ALAN I. SOLER**
	) (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

Template=SECY-028

SECY-02

NUCLEAR REGULATORY COMMISSION

Docket No. _____ Official Exh. No. 121

In the matter of PFS

Staff	IDENTIFIED ✓
Applicant	RECEIVED ✓
Intervenor ✓	REJECTED
Other	WITHDRAWN
DATE 5/7/02	Witness
Clerk V. McCarl	

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(Private Fuel Storage Facility)	)	**KRISHNA P. SINGH** and **ALAN I. SOLER**
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	)	(Utah Contention L, Part B)

VOLUME II

Friday, November 16, 2001 - 11:26 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

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process, Bob Youngs. So I'd say there was only one person I talked to.
Q. Thank you. And who at Stone and Webster have you had discussions with?
A. (DR. SOLER) Oh, let's see. John Donnell, Jerry Cooper, Stan Macy, Paul Trudeau up in the Boston office, and a couple of people in the Cherry Hill office, Mr. Ebbeson. I don't believe I've missed anybody, but there have been so many people over the years, I might have. But those are the ones that come to mind. Oh, and wait a minute. I guess I've had a conversation with Dr. Wen Tseng having to do with the input that I gave him for the pad analysis.
Q. Okay, thank you. Who is your current employer?
A. (DR. SOLER) Holtec International.
Q. And what is your position?
A. (DR. SOLER) Executive vice president and vice president of engineering.
Q. And what are your duties?
A. (DR. SOLER) Oversee the entire engineering staff in general, and specifically have direct charge of the people doing structural and seismic analysis.
Q. And now if you'll look at your resume.
A. (DR. SOLER) Okay.

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Q. If you'll review your resume, take a moment to review your resume. Could you tell me if it's current?
A. (DR. SOLER) I would say -- let me just take a look at the last item on it. I would say it's a couple of years out of date. There's no date on here saying when it was last updated, but I don't recall updating it in the near past.
Q. Is there any experience or publications that is particularly relevant to Utah Contention L, Part B that's not on your resume?
A. (DR. SOLER) Yes. There is a publication, actually it was a presentation that was given at the recent Structural Mechanics and Reactor Technology Conference in Washington, D.C.
Q. And what was the subject of this presentation?
A. (DR. SOLER) Basically dry storage casks and their behavior during seismic events.
MS. NAKAHARA: And Paul, I'd request a copy, to the extent he has one, of his presentation.
MR. GAUKLER: Okay.
Q. (BY MS. NAKAHARA) Dr. Soler, if you'll look on page 2 of your resume in the section entitled Dry Spent Fuel Storage Technology. And you have from 1992

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to present you're the lead analyst in mechanical/seismic/structural analysis, and I presume that was your description in describing your duties?
A. (DR. SOLER) That's correct.
Q. What does METCON stand for?
A. (DR. SOLER) That's just an acronym for metal/concrete construction.
Q. And have you conducted site-specific seismic analyses that estimate the probability of cask failure for sites other than PFS?
MR. GAUKLER: Objection. What do you mean by cask failure?
Q. Let me rephrase. Have you conducted site-specific cask stability analysis from seismic ground motion for facilities other than the PFS facility?
A. (DR. SOLER) Yes, I have.
Q. For which sites, or for which --
A. (DR. SOLER) For Diablo Canyon, some scoping work for Humboldt Bay, some work for Enertgy Northwest, and for -- let's see. Did we do -- I believe that we did some for Dresden and for the Tennessee Valley Authority.
Q. For the analysis at Diablo Canyon, is this for the anchored HI-STORM 100S cask?

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A. (DR. SOLER) Yes, it is.
Q. Do you recall the ground motion at Diablo Canyon?
A. (DR. SOLER) In what way?
Q. The ground motion that you estimated, or you performed your cask stability analysis.
A. (DR. SOLER) I recall specifically the general level of the zero period accelerations, if that's what you're asking me.
Q. Yes.
A. (DR. SOLER) There are a number of excitations provided to us.
Q. Approximately when was the ground motion of the zero period acceleration?
A. (DR. SOLER) Between .9 and 1.
Q. For what earthquake magnitude is a zero period acceleration at Diablo Canyon?
A. (DR. SOLER) I think that's what I just gave you. I mean, it's not a -- what do you mean by earthquake magnitude?
Q. Local Richter.
A. (DR. SOLER) I don't know the answer to that one.
Q. And approximately what time period did you prepare the Diablo Canyon analysis?

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A. (DR. SOLER) Over the period September 2000 to essentially September 2001.

MS. NAKAHARA: Can we get a copy of this analysis?

MR. GAUKLER: I'll take it under advisement.

Q. (BY MS. NAKAHARA) The scoping for Humboldt Bay, approximately what period did you do the scoping?

A. (DR. SOLER) I can't honestly recall the dates without leaving the room, I guess.

Q. That's fine. Was this for a HI-STORM 100 cask or a 100S cask?

A. (DR. SOLER) It was not.

Q. The Entergy Northwest, what type of cask system did you analyze there?

A. (DR. SOLER) That was a 100S.

Q. And where is the Entergy Northwest facility located?

A. (DR. SOLER) Richland, Washington.

Q. And what were the zero period accelerations that you looked at in that analysis?

A. (DR. SOLER) Outside the building, I believe -- I'd just better not say, because I'm guessing. But it was not as large as what I quoted you for Diablo Canyon.

MS. NAKAHARA: We'd like a copy of that

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analysis also.

MR. GAUKLER: I'll take it under advisement.

Q. (BY MS. NAKAHARA) And for the Dresden facility, what type of zero period accelerations did you use there?

A. (DR. SOLER) They were very low, about 0.2.

Q. Okay. And the Tennessee Valley facility, what type of zero period accelerations did you use?

A. (DR. SOLER) In the neighborhood of .5 to .6.

Q. And what type of cask system is at the Tennessee Valley facility?

A. (DR. SOLER) A 100S.

MS. NAKAHARA: And we'd like a copy of that analysis also.

MR. GAUKLER: I'll take it under advisement.

Q. (BY MS. NAKAHARA) If you'll look at your resume and turn to page 6. And listed as publication 47 -- oh, strike that. I asked Dr. Singh about this one.

If you'll look at page 7. Item publication 50 entitled Foundation Stresses Under Support of Freestanding Equipment Subjected to External Loads. Will you generally describe this publication, the subject of this -- not the subject. What's in this

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publication?

A. (DR. SOLER) Well, it had nothing to do with dry storage casks. It dealt with heat exchanger foundations, and the external loads were a combination of piping and seismic loads. But it was dealing with determining the stresses in the foundation of a heat exchanger.

Q. Would the principles applied to heat exchanger foundation be similar to that of a dry cask storage system?

A. (DR. SOLER) Not really. The shape was specific to heat exchangers, for the most part. I mean, if you look at the date, 1985, that was well before dry storage entered my thinking.

MS. NAKAHARA: I asked for this document earlier, Mr. Gaukler. I'd still request that we get a copy of this.

MR. GAUKLER: Okay.

Q. (BY MS. NAKAHARA) And then Dr. Soler, if you'll look at publication No. 57 on page 7 entitled Some Results from Simultaneous Seismic Simulations of All Racks in a Fuel Pool. Will you describe this publication in general terms?

A. (DR. SOLER) That was an analysis of a series of spent fuel racks considered immersed in water

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in a fuel pool and subject to a hypothetical seismic excitation. It was not specific to any plan.

MS. NAKAHARA: Okay. And we'd request this document also.

MR. GAUKLER: Okay.

Q. (BY MS. NAKAHARA) And then if you'll look at publication 59, Seismic Response Characteristics of HI-STAR 100 Cask System on Storage Pads. Dr. Soler, will you generally describe what's in this publication?

A. (DR. SOLER) This was basically an early work that we did for Pacific Gas and Electric to simply evaluate our initial attempts at anchoring casks, and at that time we were looking at the HI-STAR 100 cask system. It was a paper that was written.

MS. NAKAHARA: Okay. And we still request a copy of this document.

MR. GAUKLER: Okay.

Q. (BY MS. NAKAHARA) Dr. Soler, are you familiar with NRC's Rulemaking Plan SECY 98-126, which was published approximately in -- obviously 1998? And I apologize for not having a copy for you to look at.

A. (DR. SOLER) The answer is no.

Q. Are you familiar with Exhibit 12 of the deposition exhibits? If Paul would get you a copy of that.

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

A. (DR. SOLER) Yes.

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

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

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

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

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

analysis?

MR. GAUKLER: Objection, vague and ambiguous question.

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

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

Q. Okay.

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

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

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

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

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

A. (DR. SOLER) No.

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

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

MS. NAKAHARA: Okay, thank you.

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

MR. GAUKLER: Okay.

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

MR. O'NEILL: That's fine.

MS. NAKAHARA: Thank you. I suspect I have

less than an hour of questions.

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

MS. NAKAHARA: All together.

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

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

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

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

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

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

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

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

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

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

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