RAS 5298 72-22-ISFSI—Applicant Exhibit 102A—Rec'd 5/17/02

COPY OF 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.	)	DEPOSITION OF:
(Private Fuel Storage Facility)	)	**DR. WALTER J. ARABASZ**
	)	**(Utah Contention L, Part B)**

Wednesday, October 31, 2001 - 9:20 a.m.

Location: PARSONS, BEHLE & LATIMER
201 S. Main, Suite 1800
Salt Lake City, UT 84111

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

A. Yes, I do.

Q. Now, that basically means that the mean is significantly greater for the same probability exceedance for eastern plants than the mean -- strike that. Now, for western sites you're claiming that the mean is not that much different from the median?

A. In general, correct.

Q. Now, what in general is the relationship between the mean and the median? Is one normally bigger than the other, or not?

A. It depends.

Q. Depends?

A. The median is that value below which and above which there are an equal number of observations, or it's basically the 50th percentile level in a distribution. The mean is the arithmetic average of the values.

And as explained, for example, by Leon Reiter in his 1991 book on earthquake hazard analysis, the reason that the mean differs significantly from the median in the central and eastern United States is that the mean is more sensitive to uplyers, and this was the circumstance with modeling of -- well, let's see, of seismic source characterization, basically, in the central and eastern United States that some expert

opinions would drive the mean to be different from the median.

Q. Would you agree that the mean better reflects uncertainty than a median would?

A. Yes, I would.

Q. And why is that?

A. It's widely acknowledged by probability experts, and again, I dare not disagree.

Q. With Dr. Cornell?

A. Among others.

Q. Among others.

A. The explanation by Leon Reiter in his text I think sets forth the problem very well.

Q. So basically a mean is more sensitive to outlyers, and therefore -- and there's more outlyers -- it's more sensitive to outlyers, and therefore that captures uncertainty in that respect?

A. Right. In Yucca Mountain Topical Report 2 and in Reiter's text, there is an explanation of the history of why the median was set as the reference probability in the central and eastern United States.

Q. Is there generally a preference to use a mean or a median in the expression of standards for earthquake standards?

A. Well, in the case of Reg Guide 1.165, there

certainly was a preference, and that was the outcome of that document. I am aware that there are some probability experts who would favor a mean-based reference probability.

Q. What does the Yucca Mountain Topical Report favor?

A. If my memory serves me correctly, they put forward arguments suggesting that a mean based may be preferable.

Q. And in fact they use a mean based, don't they, in the DOE topical report?

A. Correct.

Q. And DOE Standard 1020 uses mean-based exceedance standards for its risk --

A. That's correct.

Q. -- categories. I'd like to show you what I believe is the topical report, or part of the topical report that we've been discussing. I'd like to have this marked as Exhibit 13.

(Exhibit 13 marked.)

Is this the DOE topical report that we've been discussing?

A. Correct.

Q. If you look at about the fifth page in, the bottom of the page it says Topical Report 2.

does conclude that a mean of $1E^{-4}$ would be an appropriate design basis for Yucca Mountain waste handling building?

A. I believe that is correct, yes.

Q. And they equate that $1E^{-4}$ -- doesn't this report equate the $1E^{-4}$ mean value to that -- equivalent to the exceedance value for recent and operating -- well, current operating -- let me strike that. That's too complicated. Let me rephrase it.

Doesn't this topical report conclude that the best estimate for nuclear power plants in terms of exceedance of a, say, shutdown earthquake across the entire nation is $1E^{-4}$, approximately?

A. I don't recall that detail.

Q. Okay, I'd like to have you look at. It would be section 3.1, and then it would be on page 3 of 7 of section 3.1. And if you'd look at the -- at the top of the page it says, "For the reasons discussed next, the DOE plans to use mean rather than median target annual exceedance probabilities in establishing design-basis vibratory ground motions." If you'd begin reading at that point and go through to section 3.1.2.2 to the next page.

A. (Witness reviews document.)

MR. TURK: Can we go off the record a

minute?

(Discussion off the record.)

THE WITNESS: Can you focus the question on how you want me to read it, or do you just want me to read it?

Q. The question is, doesn't DOE conclude that the mean value for current plants operating in the United States, current plants in both the western and eastern parts of the United States, the mean probability -- mean probability of exceedance is $1E^{-4}$, and that $1E^{-4}$ is applicable both to western plants and eastern plants?

A. So in summary, that would represent a conclusion for DOE decision making that would be independent of Reg Guide 1.165.

Q. Which is $1E^{-4}$.

A. Correct.

Q. Well, that's my -- do they conclude that? Do you agree with that?

A. Let me separate your question from mine.

Q. Okay.

A. To restate my question, after I have read this and if I understand a DOE position, that this DOE position has intellectual value and applicability to DOE decision making but would still be apart from Reg

Guide 1.165 as it applies.

Q. Well, we'll explore those questions once you read it, and we'll follow through sequentially.

A. (Witness reads document.) I think I'm ready.

Q. So let me just kind of go through several things. First of all, DOE does an analysis for plants in the western part of the United States, nuclear power plants, and concludes that the average mean annual probability of exceeding the safe shutdown earthquake for plants in the western part of the United States is $2E^{-4}$?

A. For the five plants, I believe for the five plants studied, correct.

Q. Do you know if there's any other plants in the western part of the United States?

A. I do not pay attention to the inventory.

Q. Okay. Have you reviewed this analysis before, and do you have any reason to disagree with it?

A. From my memory, what was established here was that the authors determined an average mean annual probability of $2x10^{-4}$ and concluded that their benchmark of $1x10^{-4}$ by comparison would be conservative for a facility less risky than a nuclear power plant.

Q. And the benchmark being the $1E^{-4}$ would be a

mean exceedance value?

A. Yes.

Q. And therefore that would provide a logical basis for DOE to use $1E^{-4}$ for a median -- strike that. This analysis provides a logical basis for DOE to use a standard of $1E^{-4}$ based upon the mean value. Would you agree with that?

A. For frequency category 2, yes. That's the benchmark that they're seeking, a hazard exceedance level for frequency category 2.

Q. And it's also fair to say that based upon this analysis that a mean exceedance value of $1E^{-4}$ approximately applies to nuclear power plants operating on both the western and as well as the central and eastern part of the United States?

A. I'm not quite ready to take that logic step with you. Let me try to step through this sequentially. For the central and eastern United States, recognize that a median of $1x10^{-5}$ ground motion is the same as a mean $1x10^{-4}$.

Q. And you agree that that's a correct representation for plants in the central and eastern part of the United States with respect to the mean value?

A. Correct, yes. Okay. Now, in the western

United States their sampling indicates a mean annual probability of exceeding the safe -- the SSE, the safe shutdown earthquake at $2x10^{-4}$, or a roughly 5,000-year -- a 5,000-year return period.

Okay, now take me to your next step in the logic.

Q. So therefore, using a mean of $1E^{-4}$ approximately represents all the nuclear power plants in the western, eastern United States?

A. That's a reasonable judgment.

Q. Now, you were talking about -- before about the relevance of this topical report to Regulatory Guide 1.165. Does what we just walked through with respect to this topical report in any way affect your evaluation of Regulatory Guide 1.165, or, more importantly, does it in any way affect your evaluation of the staff's rationale set forth in the Safety Evaluation Report with respect to those first few bullets that we talked about in Exhibit 3?

A. When the staff speaks, presumably it speaks on the basis of its own regulations and guidelines. And when it makes an assertion that's inconsistent with its own guidelines, then my judgment is that there's flawed logic. They reached the conclusion that the $1x10^{-4}$ mean *a priori* was equivalent to the $1x10^{-5}$

NUCLEAR REGULATORY COMMISSION

Docket No. _____ Official Exh. No. 102A

In the matter of PFS

Staff _____	IDENTIFIED ✓
Applicant ✓	RECEIVED _____
Intervenor _____	REJECTED _____
Other _____	WITHDRAWN _____
DATE 5-17-02	Witness _____
Clerk D. Kent	