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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
TEXAS UTILITIES ELECTRIC)	Docket Nos. 50-445 and
COMPANY, ET AL.)	50-446
)	
(Comanche Peak Steam Electric)	(Application for
Station, Units 1 and 2))	Operating Licenses)

AFFIDAVIT OF ROBERT C. IOTTI IN SUPPORT
OF APPLICANTS' REPLY TO CASE'S ANSWER TO
APPLICANTS' MOTION FOR SUMMARY DISPOSITION
REGARDING THE UPPER LATERAL RESTRAINT BEAM

I, Robert C. Iotti, having first been duly sworn hereby depose and state as follows: I am the Vice President of Advanced Technology for Ebasco Services, Inc. I have been retained by Texas Utilities Electric Company to oversee the assessment of allegations concerning the design of piping and supports at Comanche Peak Steam Electric Station. A statement of my educational and professional qualifications is attached to Applicants' letter of May 16, 1984, to the Licensing Board. I have previously submitted an affidavit ("Iotti Affidavit") in support of Applicants' Motion for Summary Disposition Regarding Upper Lateral Restraint Beam, filed on May 20, 1984.

Q. What is the purpose of this affidavit?

A. I address herein the assertions made by CASE in its August 26, 1984, Partial Answer to Applicants' Statement of Material Facts Regarding the Upper Lateral Restraint Beam. I will respond separately to each of CASE's allegations, as set forth in the Affidavit of Messrs. Jack Doyle and Mark Walsh ("Affidavit") regarding each statement of material fact which accompanied Applicants' motion.

Q. Has CASE presented any arguments which cause you to alter the conclusions made in your original affidavit?

A. No. CASE has failed to produce analyses or calculations to back any of the assertions in its answer. In fact, most of its arguments are factually incorrect and indicate CASE has not taken the time to or does not understand the analyses which have been performed. CASE simply reiterates their original arguments which are fully disproven by Applicants' analyses, rather than addressing each statement of material fact. CASE's arguments are either irrelevant and/or technically unsupportable.

Q. What is your response to CASE's comments regarding Applicants' first statement of material fact?

A. In the first instance, CASE's assertion that the "primary purpose" of the upper lateral restraint is to restrain the concrete walls (Affidavit at 1) is absurd. The walls are fully capable of withstanding loads without the assistance of the upper (or lower) lateral restraints. In fact, the

presence of such beams produces additional loads in the walls which CASE alleged had not been properly considered. CASE apparently misunderstands the fundamental purpose of the restraints, i.e., to restrain movement of the steam generator under certain postulated accident scenarios.

Second, CASE's characterization of the inclusion of the lower lateral restraint in Applicants' analysis as a "red herring" (Affidavit at 2) is technically unjustifiable. Even CASE admits its presence and that it has an effect on the analysis. CASE's claims notwithstanding, Applicants' analysis provides a realistic assessment of the actual configuration of the steam generator compartment, conservatively assuming components to be subjected to worst case accident scenarios and environmental conditions. CASE does not, and indeed could not, dispute this fact.

Q. What comments do you have regarding CASE's assertions concerning Applicants' second statement of material fact?

A. CASE first asserts that Applicants did not consider LOCA (Affidavit at 3). To the contrary, it is clear from my original affidavit that LOCA has been considered. In fact, the very footnote cited by CASE (Iotti Affidavit, note 5, pp. 13-14) indicates that LOCA was considered despite the fact that the thermal loads due to LOCA (or other faulted conditions) need not be considered for the beam itself. The precise LOCA event postulated for this analysis is, in fact, described at pages 6-9 of my affidavit. Further, at page 14

of my affidavit, it is plainly stated that LOCA has been considered. Also, Table 2 of the affidavit expressly provides data for LOCA conditions. Thus, CASE's claim that Applicants did not consider LOCA effects is unfounded.

Second, CASE argues (Affidavit at 3-4) that Applicants neglected to consider the forces created on the concrete walls (presumably from LOCA or MSLB (Main Steam Line Break)), nor did they check shear stresses of the bolts or the beam itself. CASE also claims (Affidavit at 4) that Applicants have not, but should have, analyzed LOCA environmental effects on steel structures. Contrary to CASE's claim, Table 1 of my original affidavit plainly shows that the forces exerted on the concrete walls have been considered. In addition, although neither Table 1 nor Table 2 tabulates shear stresses in the concrete, the beams or the bolts, it is not true as CASE claims that these effects were not checked. CASE does not provide the basis for this claim. In fact, CASE never requested such information on discovery. Nevertheless, I have attached to this affidavit, as Table 1, the maximum shear stresses seen in the concrete, the beams and the bolts, from the analyses which were performed. All stresses are within allowable values. Indeed, the original analysis showed that the shear capacity of the beam and of the bolt group at their respective allowable stresses exceeded the maximum LOCA loads. As the

actual shear loads on the beam are less than those used in the original design, there was no need to reinvestigate shear stresses in the beam and bolts in this reanalysis.

Finally, CASE asserts (Affidavit at 5-6) that Applicants have "in effect admitted that they did not have a sound basis for initiating construction of the support . . .". CASE's assertion is premised on a misunderstanding of the facts and purpose of Applicants' analysis. As set forth in Applicants' Plan to Respond to Memorandum and Order (Quality Assurance for Design), February 3, 1984, at 6, Item 8, Applicants presented a detailed analysis to demonstrate the adequacy of the upper lateral restraint design. The analyses performed by Applicants fully satisfies Applicants' commitment in their Plan. These analyses demonstrate not only the adequacy of the design but confirm the validity of the judgment employed in the original design.

- Q. What observation do you wish to make regarding CASE's assertions concerning Applicants' third statement of material fact?
- A. CASE apparently misread the wording of Applicants' third statement. CASE seems to believe that Applicants meant that each assumption underlying our analysis was conservative. (Affidavit at 8.) In fact, that statement was not intended to convey the idea that each of the five points enumerated represents a conservatism in the analyses. Rather, the statement was intended, as is evident if one reads the

entire statement, to point out that overall the analytical assumptions are conservative and to identify which of the assumptions made in the analysis are conservative and which simply represent requirements. Many of CASE's statements (Affidavit at 7-12) reflect their misinterpretation of this statement. Nevertheless, I will respond to CASE's comments which are not clearly premised on their misunderstanding.

First, CASE incorrectly asserts (Affidavit at 8) that the maximum LOCA or main steam line break (CASE mixes the two events) temperature can occur at the same time there are jet impingement loads due to the same accident conditions. CASE contends, therefore, that Applicants' assumption of simultaneous occurrence of these loads is not conservative. To begin with, CASE is surely cognizant of the difference between a LOCA and a main steam line break. A LOCA is a loss of coolant accident resulting from a break in the primary piping. A MSLB is a break in the main steam line. Applicants make this distinction for two reasons: first, these accident events are independent of one another and the NRC does not require that they be considered in the same accident scenario; second, a jet from the MSLB could not direct much fluid flow into the steam generator compartment because of the geometry of the steam line and the compartment. Consequently, the temperature of the air inside the compartment which heats the beam would lag behind the mechanical reaction load from the jet. The beam itself

would reach maximum temperature much later, as shown in Figure 2 of Appendix I to my original affidavit. On the other hand, the LOCA jet, being located within the steam generator compartment, can heat the atmosphere within the compartment more quickly. Consequently, the beams (both upper and lower lateral restraints) reach their maximum temperature sooner. Nevertheless, the time at which the peak temperatures are reached is also well beyond the time of peak mechanical response to the LOCA jet, as seen in Figure 1 of Appendix I to my original affidavit. Similarly, the mechanical load due to jet and the peak pressure differential across the walls occur at different times although they have been conservatively¹ assumed to occur simultaneously. In sum, CASE is simply wrong in their contention that Applicants' assumptions regarding the timing of these loads are not conservative.

With regard to Applicants' assumption of simultaneous expansion of the upper and lower lateral restraint, CASE asserts that the lower restraints will expand at a slower rate (even suggesting (erroneously) that it may be more appropriate to assume they do not expand at all). Thus, CASE contends Applicants' assumption is not conservative. (Affidavit at 9.) CASE does not dispute the fact that both

¹ CASE's claim that this combination is not conservative, but required by the FSAR, is false. The FSAR clearly states that in combining loads the maximum values need not be used when time history analyses are performed to show otherwise (FSAR Section 3.8.3.3.2, p. 3.8-81).

restraints will expand and, because both are in the same compartment, are subjected to the same accident environment. For the LOCA scenario, at the time the upper lateral restraint reaches peak temperature (216 seconds, 285^oF) the temperature of the lower lateral restraint is only slightly lower than its peak temperature, achieved soon afterward (285^oF v. 289^oF). (See my original affidavit, Appendix I, figure 1) This four degree difference is, contrary to CASE's implication, inconsequential to the evaluation of the upper and lower restraint beams' restraining effects and wall loadings. Moreover, the peak temperature seen by both beams for the main steam line break has been conservatively assumed to be 370^oF instead of the calculated 355^oF.

Further, CASE asserts that using 450 psi as the tensile strength of concrete is not conservative under certain conditions (Affidavit at 9-11). CASE claims that under particular conditions zero tensile strength should be assumed (Affidavit at 11). CASE apparently has not read my original affidavit carefully. As clearly indicated therein, Applicants analyzed two different limiting cases, one which employed 450 psi tensile strength and the other which used zero tensile strength. (Iotti Affidavit at 11 and Table 1). As can be seen from the results of Table 1 of the affidavit, the case of the high concrete tensile strength produced the most adverse results. CASE also fails to recognize that where concrete was computed to crack, as a result of

exceeding its tensile strength, the method of analysis employed correctly accounts for the fact that there is no tensile resistance. Thus, CASE's claims regarding the selection of concrete tensile strength for Applicants' analyses are misleading and unfounded.

Q. Do you have any additional comments regarding CASE's discussion of the third statement of material fact?

A. No. The remainder of CASE's discussion of this statement is simply unfounded speculation with no specific assertions as to which further comment is possible.

Q. Do you agree with the reply of CASE to the fourth statement of material fact?

A. No. Results shown in Tables 1 and 2 of my original affidavit include stresses due to seismic and mechanical loads. (The specific loading conditions for each accident scenario are set forth in the text of that affidavit at 8-11.) CASE's statements, therefore, are absolutely wrong.

Q. Do you agree with CASE's comments on the fifth statement of material fact?

A. No. In the first instance, the NRC has never required that one postulate a simultaneous or sequential main steam line break and a loss of coolant accident. CASE's claim that this sequence of events "can" occur is, therefore, inconsistent with NRC requirements. CASE has clearly gone well beyond current regulatory criteria in trying to introduce new, unique accident scenarios.

Second, CASE argues that there is a possibility that peak mechanical and peak thermal loads for the breaks which have been considered may coincide. (Affidavit at 13.) To the contrary, Applicants' time history analyses which follow the development of mechanical loads from the assumed break and the environmental effects caused by the fluid escaping from the break, clearly demonstrate that the mechanical loads have decreased to insignificance by the time the thermal expansion of the beams build to their maximum. These analyses show that there exists a thermal expansion load coincident with the peak mechanical loads, but that this thermal load is significantly lower than the maximum value of the thermal expansion load. Applicants have properly considered this smaller coincident thermal expansion load with the mechanical loads.

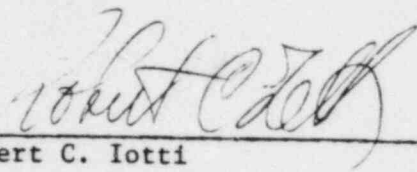
- Q. What are your comments regarding CASE's reply to Applicants' sixth statement of material fact?
- A. CASE continues to assert that mechanical loads can occur after a main steam line break (Affidavit at 13). As already discussed, CASE's postulated scenario is not realistic and is inconsistent with applicable regulatory requirements. Applicants have shown by analysis how the accident scenario proceeds from break postulation to compartment pressurization and heating and loading of the beams. CASE has failed to identify even a simple realistic scenario, consistent

with NRC regulations, that would produce the simultaneous mechanical and peak thermal loads it asserts should be addressed. Its assertions are, therefore, without merit.

Q. Do you have any other comments on CASE's affidavit?

A. Yes. CASE implies that Applicants had to resort to the complex analyses to verify the adequacy of the design of the upper (and lower) lateral restraint, because the original design effort was improper (Affidavit at 14). To the contrary, the validity of the engineering judgment originally employed by Applicants in the design of these restraints has been confirmed by the analysis performed as part of Applicants' Plan. Further, the complex analyses performed here were necessary to satisfy unresolved questions which arose in the context of the hearing process and not, as CASE asserts, because the designs of the restraints were found to be inadequate. In fact, in the normal course, reasonable technical people would have answered these questions using appropriate technical judgment before such a detailed analysis would have been necessary.

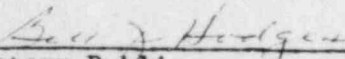
Finally, CASE does not specify why it believes that (Affidavit at 14, item (3)) coupling adjoining structures is improper. Applicants' model is realistic and entirely proper.



Robert C. Iotti

STATE OF TEXAS
COUNTY OF SHERRELL

Subscribed and sworn to before me this 26th day of October, 1984.



Notary Public

my Commission Expires March 28, 1988

TABLE 1
MAXIMUM SHEAR STRESSES
UPPER LATERAL BEAM

ITEM	SHEAR STRESS		REMARKS
	Maximum Actual	Allowable	
Lateral Beam	7.7 ksi	25 ksi	Occurs during LOCA, at reactor wall end of beam.
Lateral Beam Anchor Bolts (2½" Dia.)	11.3 ksi	36.7 ksi	Occurs during LOCA, at reactor wall end of beam.
Concrete Com- partment Wall -concrete -shear ties	126.5 psi 24.5 ksi	126.5 psi 60.0 ksi	Occurs in element no. 1439 during main steam break at peak temperature (concrete tensile strength = 450 psi) at external wall end of beam. Shear stress in the wall section is 163.2 psi. Per ACI 318, concrete carries load up to maximum allowable capacity of 126.5 psi, shear ties carry remainder.

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OFFICE OF SECRETARY
DOCKETING & SERVICE
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)	(Application for
(Comanche Peak Steam Electric)	Operating Licenses)
Station, Units 1 and 2))	

CERTIFICATE OF SERVICE

I hereby certify that copies of "Applicants' Reply to CASE's Answer to Applicants' Motion for Summary Disposition Regarding the Upper Lateral Restraint Beam", in the above-captioned matter was served upon the following persons by express delivery (*), or deposit in the United States mail, first class, postage prepaid, this 26rd day of October, 1984, or by hand delivery (**) on the 29th day of October, 1984.

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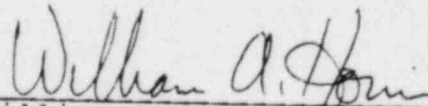
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