

DOCKETED  
USNRC

'84 JUN 19 09:18  
June 18, 1984

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

APPLICANTS' MOTION FOR SUMMARY  
DISPOSITION REGARDING CONSIDERATION  
OF LOCAL DISPLACEMENTS AND STRESSES

Pursuant to 10 C.F.R. § 2.749, Texas Utilities Electric Company, et al. ("Applicants") hereby move the Atomic Safety and Licensing Board for summary disposition of the Citizens Association for Sound Energy's ("CASE") allegations regarding the consideration of local displacements and stresses. As demonstrated in the accompanying affidavit and statement of material facts, there is no genuine issue of fact to be heard regarding this issue. Applicants urge the Board to so find, to conclude that Applicants are entitled to a favorable decision as a matter of law, and to dismiss this issue from the proceeding.

I. BACKGROUND

CASE has raised certain concerns regarding Applicants' consideration of the effects of local stresses and displacements in pipe supports. In particular, CASE has raised four concerns:

(1) that the use of cinched U-bolts and zero clearance box frames will induce unacceptable stresses in piping as well as the U-bolts and box frames themselves because of the thermal expansion of the pipe and service loads from the piping system (CASE Proposed Findings, Section IV); (2) that Applicants' design process does not adequately account for the stresses induced in anchors due to thermal expansion of the pipe (CASE Exhibit 669B, Section 14); (3) that Applicants' design process does not adequately address the stresses in tube steel connections (CASE Proposed Findings at V-5); and (4) that local deflections and deformations have not been adequately incorporated into Applicants' deflection calculations in the design and analysis of pipe supports (CASE Proposed Findings at IX-1, IK-17).

In Applicants' Proposed Findings (at 50, 57-60 and 69-70), we addressed the specific CASE allegations discussed in their Proposed Findings, viz, the effects of cinched U-bolts and zero-clearance box frames (item 1), local deflections (item 4) and tube steel connections (item 3). We discussed these issues further in our Reply to CASE's Proposed Findings, at pages 17-19, 21-22 and 30-31.

The issue relating to stresses on pipes caused by cinching of U-bolts was addressed by the Board at pages 33-41 of its Memorandum and Order (Quality Assurance for Design) dated December 28, 1983. In regard to this issue, the Board concluded (id. at 37): "in the absence of any direct challenge to Mr. Doyle's calculations and in the absence of any data supporting

the Staff's position, the Applicants' burden of proof has not been met." The Board did not specifically address the other allegations regarding local stresses and displacements.

In response to the Board's Order, Applicants have performed extensive tests and analyses regarding the effects of cinching down of U-bolts (see Affidavit of Iotti and Finneran Regarding Cinching Down of U-bolts, to be filed shortly). With respect to the other allegations, while the Board did not specifically address these, Applicants have undertaken to address these allegations by performing reviews as part of Item 12 of its Plan to Respond to Memorandum and Order (Quality Assurance for Design), filed February 3, 1984. Plan Item 12 provides, as follows:

Provide evidence of a reevaluation of each individual support identified by Messrs. Doyle and Walsh to determine the acceptability of the design of each support.

Accordingly, Applicants have evaluated those supports identified by CASE as being subjected to local stresses and displacements which CASE contends should have been, but were not, considered. In addition, Applicants have also reevaluated other supports referenced by CASE (for other purposes) for these effects. These evaluations demonstrate that these local effects do not create any unacceptable stresses in the supports, contrary to CASE's assertions. Accordingly, the Board should find that there is no valid basis for CASE's allegations regarding local stresses and displacements.

II. APPLICANTS' MOTION FOR SUMMARY DISPOSITION

A. General

Applicants have previously discussed the legal requirements applicable to motions for summary disposition in their "Motion for Summary Disposition of Certain CASE Allegations Regarding AWS and ASME Code Provisions Related to Welding," filed April 15, 1984 (at 5-8). Accordingly, Applicants incorporate that discussion herein by reference.

B. CASE's Allegations Regarding  
Consideration of Local Displacements and  
Stresses Should be Summarily Dismissed

As indicated above, CASE has made four allegations regarding the consideration of local displacements and stresses in Applicants' pipe support design process. Specifically, CASE claims that Applicants have not properly considered (1) stresses induced by cinched U-bolts and zero clearance box frames due to the thermal expansion of the pipe, (2) stresses induced in anchors due to the thermal expansion of the pipe, (3) stresses induced in tube steel walls due to welded attachments, and (4) local deflections and deformations. Applicants address each of these allegations in the accompanying affidavit of John C. Finneran. As demonstrated therein, Applicants' pipe support designs fully satisfy applicable stress allowables even when these effects are included in the design.

1. Induced stresses from cinched u-bolts  
and zero clearance box frames

CASE contends that the radial thermal expansion of the pipe and service loads from the piping system will induce unacceptable stresses in cinched U-bolts and zero clearance box frames, as well as the piping itself. Mr. Finneran's affidavit addresses the potential stresses from zero clearance box frames. The effects of cinched U-bolts will be addressed in the affidavit of Dr. Robert C. Iotti and Mr. Finneran, which will be filed shortly.

Applicants have identified 51 box frame supports with zero clearance (out of 17,000-18,000 total supports) in Unit 1 and common areas (Finneran Affidavit at 4). Only one box frame with zero clearance exists on a piping run with a maximum water temperature greater than 200<sup>o</sup>F. This is support SI-325-002-S32R (CASE Exhibit 891 (also 928)). The maximum temperature of the pipe in this case is 350<sup>o</sup>F. (Finneran Affidavit at 4.)

To evaluate the effect of these local pipe stresses, Applicants utilized the conservative allowables employed by Gibbs & Hill for assessing local pipe stresses associated with integral welded attachments. (Finneran Affidavit at 3-4.) (The ASME Code provides no quantitative criteria for the consideration of such stresses, although it does provide qualitative guidance which leaves the designer free to determine the method for quantifying this guidance. (Finneran Affidavit at 3.))

As for the stresses in the box frame itself, Applicants utilized a standard methodology which accounts for the relative flexibilities of the pipe-frame system (see Finneran Affidavit at 4-5.) To assess the significance of the calculated stresses, Applicants applied ASME Code Section NF-3231(a) which governs the consideration of these stresses. (Finneran Affidavit at 3.)

Applicants first performed a detailed analysis of the support on the 350<sup>o</sup>F line, set forth in Attachment A to Mr. Finneran's affidavit. The results of that analysis demonstrate that even when including the local stress induced in the frame from the thermal expansion of the pipe with other loads, all stresses in the frame are less than Code allowables. With respect to the local stresses induced in the piping, Applicants' analysis demonstrates that all stresses in the pipe are also less than allowables.<sup>1</sup> (Finneran Affidavit at 4-6.)

In addition, to address the validity of CASE's assertions regarding the loads between the support and the pipe, Applicants analyzed the support identified by CASE in its Proposed Findings in support of its position on this matter. Applicants conservatively assumed in that analysis that the temperature of the line was 200<sup>o</sup>F, although the actual maximum temperatures is 130<sup>o</sup>F. By taking this conservative approach Applicants have

---

<sup>1</sup> This support was also assessed by Cygna (see Nancy H. Williams' testimony (Board April 1984 Exhibit No. 1) in response to Doyle Question #15. Cygna's analysis also demonstrated that the stresses in both the pipe and the box frame remained well below applicable allowables even when both thermal and mechanical loads were combined.

effectively bounded the remaining supports on low-temperature lines. The results of Applicants' calculation indicate that even at 200°F, the resulting force between the pipe and the frame will be 454 lbs. This is obviously not even close to CASE's calculated force of 27,280 lbs. In short, CASE's assertion that the thermal expansion of the piping would result in large loads between the frame and the pipe even in these low-temperature lines is incorrect. (Finneran Affidavit at 6.)

2. Stresses induced in anchors

CASE also alleged that Applicants had not adequately accounted for the stresses induced in anchors<sup>2</sup> due to thermal expansion of the pipe, and identified three supports (CASE Exhibit 669B, Section 14) for which it claims these effects should have been considered. Applicants have performed a conservative analysis of the three supports to assess the significance of these effects.<sup>3</sup> As demonstrated in the analyses attached to Mr. Finneran's affidavit, conservatively including the thermal expansion effects of the pipe in the assessment of the supports produced no overstressed conditions (Finneran

---

<sup>2</sup> The term "anchors" as used by CASE in this allegation refers to supports on the piping system which are designed to restrain the movement and rotation of the pipe in all three directions.

<sup>3</sup> One of these supports (CC-1-008-029-S33A) (see CASE Exhibit 669B, pages 14j - 14m) was completely redesigned (for unrelated reasons) subsequent to CASE's allegation. Nonetheless, Applicants included the new design in their analysis.

Affidavit at 7-8.)<sup>4</sup> In sum, these analyses demonstrate that there is no basis for CASE's assertion that these effects are significant and that they should be calculated in support designs.

3. Stresses induced in tube steel walls

CASE alleges that Applicants have not adequately addressed stresses in the walls of tube steel members induced by welded attachments (see CASE Proposed Findings, Section V at V-5). Each of Applicants' support design organization assess these effects on a case-by-case basis when deemed appropriate by the engineer.<sup>5</sup> (Finneran Affidavit at 9.)

CASE did not perform any calculations to substantiate its position regarding these effects. Rather, CASE premised its position on certain factors it believed indicated that analyses should routinely be performed to assess these effects. CASE's premises for its position are, however, in error. In the first instance, CASE incorrectly implied (CASE Proposed Findings at V-5) that the minimum width ratio of tube-to-tube connections that Applicants used up to September of 1982 was 0.8. (CASE

---

<sup>4</sup> Cygna analyzed a similar support for these same effects in their response to Doyle Question 15 (see Testimony of Nancy H. Williams, Board April 1984 Ex. 1 at 33.) Their results also demonstrated that all stresses in the support were far below applicable allowables. (Finneran Affidavit at 8.)

<sup>5</sup> The NRC Staff also reviewed Applicants' practices in this regard and had no concern regarding the adequacy of Applicants' practice. The Staff reviewed a random sample of 100 vendor certified supports selected by the Staff and found Applicants had considered these local effects. (See SIT Report (Staff Exhibit 207) at 42; Tr. 7030-32.)

apparently intended to refute a portion of the NRC Staff testimony with this point.) However, CASE's argument is premised on a misinterpretation of a guideline which applies to the specification of weld type and has no relationship to Applicants' consideration of local stresses in tube connections in support design. (Finneran Affidavit at 10.) In addition, CASE incorrectly claimed that the tube-to-tube ratio for the support for which it contended these stresses should be considered was less than 0.4. The actual connection ratio is .5625. Applicants analysis of this connection indicated that the actual stress for this connection is 2261 psi, or 57% of the allowable. Thus, contrary to CASE's assertion, the design of this connection was clearly adequate. (Finneran Affidavit at 10-11.)

To assess the appropriateness of Applicants' design practice regarding the consideration of these local stresses, Applicants performed a detailed local failure analysis for the worst case supports which CASE contends could be inadequately designed. In all cases the local stresses were found to be far less than the allowables. (Finneran Affidavit at 11-12.)

In short, there is no valid basis for CASE's assertion that Applicants' design practices with respect to the consideration of these effects would result in unacceptable support designs.

4. Local deflections and deformations

Finally, CASE alleged that Applicants did not include local deflections and deformations in their deflection calculations for support designs (CASE Proposed Findings at IX-1). Indeed, it has never been Applicants' practice to include local effects or standard component deflections in calculating support deflections for class 2 and 3 supports. Thus, CASE's assertion is, in effect, correct. Applicants' practice is, however, standard industry practice which is premised on sound engineering principles and results in adequate support designs.<sup>6</sup> (Finneran Affidavit at 12-13.)

Applicants consider the deflections of the structural portions of each support in calculating deflections for comparison to the 1/16" deflection guideline. To assess the significance of these effects, Applicants selected 15 worst case supports from CASE Exhibit 669B for assessing these effects, along with a support used by CASE in the cross-examination of the Staff on this subject. Applicants assessed each of these support's deflections, including the local and component effects CASE contends should be included in the deflection calculations. (Finneran Affidavit at 13.)

Applicants' evaluation demonstrated that even with the consideration of these effects virtually all the support deflections remained below Applicants' deflection criterion.

---

<sup>6</sup> In this regard Dr. Bjorkman testified that it was not industry practice to evaluate particular types of local deformations which CASE alleged should be considered (Tr. 12482-83).

Even for the supports for which deflections did not remain below the deflection criterion, the stiffnesses of the supports remained within the acceptable range of stiffnesses. Thus, CASE's allegation that inclusion of these local effects would lead to excessive deflections is not valid. (Finneran Affidavit at 13-15).

Further, as Mr. Finneran notes, if Applicants had intended to include these local effects in their deflection calculations, they would have set a deflection criterion higher than a 1/16". As demonstrated above, although these local effects may result in potential deflections slightly greater than 1/16", there is no safety significance to this fact. Thus, Applicants could have selected a larger deflection criterion to account for these effects. (Finneran Affidavit at 15.)

CASE's final allegation regarding Applicants' consideration of support deflections and deformations is that Applicants' support designs will have excessive deformations and, thus, Applicants will not have satisfied the guidance contained in Regulatory Guide 1.124. CASE apparently contends that the deformations and deflections in Applicants' support designs constitute the "large deformations" mentioned in the Regulatory Guide, where it is stated:

Component supports are deformation sensitive because large deformations in them may significantly change the stress distribution in the support system and its supported components. [Regulatory Guide 1.124, Section B.]

(Finneran Affidavit at 16.)

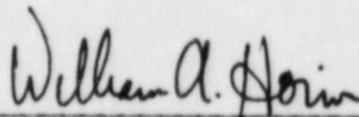
However, CASE' is in error in two respects. In the first instance, Regulatory Guide 1.124 is applicable specifically to Class 1 supports. Applicants in fact perform complete stiffness calculations for Class 1 supports, including consideration of local effects. (Finneran Affidavit at 16.)

In addition, irrespective of the support classification, the discussion in Regulatory Guide 1.124 regarding large deformations is related to the use of plastic analysis methods. With respect to support designs using elastic analysis, as Applicants use, Regulatory Guide 1.124 recognizes that deformations will be small. Thus, CASE's concerns regarding the consideration of deflection effects for support designs using elastic analysis are not valid. (Finneran Affidavit at 16-17.)

### III. CONCLUSION

For the foregoing reasons, Applicants' motion for summary disposition should be granted.

Respectfully submitted,



---

Nicholas S. Reynolds  
William A. Horin  
BISHOP, LIBERMAN, COOK, PURCELL  
& REYNOLDS  
1200 Seventeenth Street, N.W.  
Washington, D.C. 20036  
(202) 857-9817

Counsel for Applicants

June 18, 1984