July 9, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

APPLICANTS' MOTION FOR SUMMARY DISPOSITION
REGARDING ALLEGATIONS CONCERNING CONSIDERATION
OF FORCE DISTRIBUTION IN AXIAL RESTRAINTS

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 regarding the allegations concerning the consideration of force distribution in axial restraints. As demonstrated in the accompanying affidavit and statement of material facts, there is no genuine issue of fact to be heard regarding these matters. Applicants urge the Board to so find, and to conclude that Applicants are entitled to a favorable decision as a matter of law, and to dismiss the issue from the proceeding.

I. BACKGROUND

In its Memorandum and Order (Quality Assurance for Design), issued December 28, 1983 ("Memorandum and Order"), the Board addressed certain allegations raised by CASE regarding pipe support designs. The Board did not address this particular allegation. The Board indicated, however, that it believed additional information should be received regarding CASE's allegations and, accordingly, suggested that Applicants proposed a plan to address CASE's allegations. Memorandum and Order at 72-75.

In response to the Board's suggestion, Applicants proposed on February 3, 1984, a plan that would provide the Board with the information necessary to satisfy the concerns presented in its Memorandum and Order. This motion concerns Plan Item 15,[1] which responds to two sets of allegations made by CASE. CASE alleges that Applicants' have failed to adequately consider the effects of welded attachments (trunnions) to trapeze-type supports. CASE argues that Applicants ignore the rotational resistance of the restraint which would have a significant adverse affect on the piping analysis and support loads. (CASE Proposed Findings,

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1 Applicants' Plan to Respond to Memorandum and Order (Quality Assurance for Design), February 3, 1984 ("Applicants' Plan"). The accompanying affidavit provides Applicants' response to Item 15 of Applicants' plan. That task, as stated in the plan, is to

> provide evidence of how the design has accounted for the torsional resistance of axial restraints. This evidence will be generated through the performance of analyses.

Section XVII.) Further, CASE alleges that Applicants' assessment of the distribution of loads in axial restraints utilizing lug pipe attachments. ~~CASE argues that~~ Applicants' analyses of this type of support fails to consider certain factors which affect the loads in the support, piping and attached lugs. (CASE Proposed Findings, Section XII.) Applicants addressed each of these allegations in their Proposed Findings[2] at 55-57 and 64-65. In addition, Applicants also addressed these assertions in their Reply to CASE's Proposed Findings[3] at 36-37 and 41-43. Applicants set forth below their analyses performed in response to Item 15 of Applicants' plan.

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 Relating to Welding", filed April 25, 1984 at 5-8. Accordingly, we incorporate that discussion herein by reference.

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2 Applicants' Proposed Findings of Fact in the Form of a Partial Initial Decision, August 5, 1983.

3 Applicants' Reply to CASE's Proposed Findings of Fact and Conclusions of Law (Walsh/Doyle Allegations), September 6, 1983.

Further, the Board recently addressed the standards applicable to the disposition of the motions submitted as part of Applicants' Plan in its June 29, 1984, Memorandum and Order (Written-Filing Decision # 1: Some AWS/ASME Issues). There the Board noted that the standard applicable to the resolution of Applicants' motions will be consistent with the Board's intention of disposing of these outstanding issues in written pleadings. Specifically, the Board indicated that whether a hearing is necessary to resolve these matters will be decided on a determination of whether sufficient information has been presented to enable the Board to make a reasoned decision. Accordingly, this standard should be applied to the instant motion. We believe, however, that the matters set forth below demonstrate nonetheless that Applicants would be entitled to summary disposition in accordance with the standards set forth in 10 C.F.R. §2.749.

B. The Outstanding Issues Regarding Applicants' Consideration of Force Distribution in Axial Restraints Should be Summarily Dismissed

1. CASE's allegations

CASE alleges that Applicants' design approach for axial restraints fails to consider certain loads transmitted to the support and pipe. CASE's allegation concerns two types of axial restraints. The first type is configured as a trapeze with welded attachments to the pipe and support (trunnion) which distributes the axial load to the support. The second type of

support distributes the axial load to a frame by lugs welded to the pipe. (Affidavit at 2-3.) These allegations are addressed separately in the attached affidavit.

2. Welded attachments to trapezes (trunnions)

As noted above, CASE alleges that Applicants' design methodology for analyzing these supports ignores the rotational resistance of the restraint which results in failure to account for certain effects on the piping and supports. Applicants' design approach for these supports is to model the support as a single support acting in the axial direction. (Affidavit at 3.)

As demonstrated in the attached affidavit, Applicants' modelling technique is appropriate. The modelling technique urged by CASE would be very conservative and not necessarily a more realistic modelling technique. Nevertheless, Applicants evaluated the significance of the effects CASE alleges should be considered by reanalyzing several piping stress problems utilizing the modelling assumptions CASE would have Applicants employ. (Affidavit at 3-4.)

These analyses demonstrated that Applicants' assumption of excluding the rotational restraint of the trapeze support from the analysis has virtually no effect on pipe stresses. (Affidavit at 4-5).

With respect to the effect of CASE's modelling assumption on the supports, Applicants' analyses demonstrated that changes in loads on the supports on the reanalyzed stress problems occur

only with respect to the trapeze supports themselves. This effect is expected in that modelling the rotational constraint of the support will produce an additional load on each side of the trapeze not previously analyzed. However, as discussed below, these additional loads do not exceed applicable allowables. (Affidavit at 5-6.)

To fully assess the effects of modelling the rotational constraint of the support Applicants evaluated every; Unit 1 and common double trunnion support employed at Comanche Peak for these effects. Those analyses demonstrated that the total loads imposed on each side of the trapeze supports would be acceptable, i.e., in no case were Code allowables exceeded, when the additional loads were factored into the support design.[4] (Affidavit at 6-8.)

In sum, CASE's assertion that Applicants' modelling assumptions for these supports is incorrect is unfounded. No basis exists to conclude that this practice is not appropriate or that another analytical model (including that CASE argues should

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4 To assess these additional loads Applicants employed allowables permitted by Section NF-3231.1 of the ASME Code for evaluation of self-limiting loads resulting from the constraint of free-end displacement. This approach is appropriate given the self-limiting nature of the load imposed from the torsional restraint of the pipe. That load is self-limiting in that the rotation which produced the increased load will not exceed that which would occur if there had been no rotational constraint. In all cases the "free" rotation of the pipe (computed in the absence of rotational restraint) at the location of the support is very small. (Affidavit at 7.)

be used) would demonstrate that the support loads and pipe stresses are not within applicable code allowables. (Affidavit at 9.)

3. Lug-type restraints

CASE presents two concerns regarding the analysis of axial restraints employing lugs attached to the pipe. First, CASE argues that installation of the lugs on the pipe will not achieve perfect symmetry and, therefore, distribution of the load according to the stiffness of the support structure is invalid. Second, CASE argues that the angularity of the pipe (due to thermal expansion at the point of the support) will preclude contact of all lugs. Thus, the structure should be analyzed assuming a single point contact at the extreme point of the support. (CASE Proposed Findings at XII-6.)

With respect to CASE's first concern, Applicants do not disagree that perfection in construction may not be achieved. However, it is neither necessary nor reasonable to expect that the four lugs can be installed in a perfect circumferential plane with zero tolerance. We expect, however, the lugs to be installed within reasonable limits and, indeed, have found this to be the case. Applicants' inspection of 29 supports which have lugs welded to the pipe disclosed that the maximum deviation, i.e., difference in distance between any of the lugs and the frame, on their respective sides of the frame, exceeded 1/16". This instance involved a deviation of 5/64 inch on one side of

the support. In addition, in most instances at least two lugs on either side of the frame were found to be of equal distance from the frame. As a result of this inspection, it may be concluded that the stresses which may occur in the pipe, lug or frame as a result of differential engagement of the lugs will be localized. These potential local deformations would be self-limiting and readily redistribute the load to other lugs. Only one other lug need be engaged to fully resist the entire load which may be imposed. (Affidavit at 10-11.)

With respect to CASE's assertion that the loads should be assumed to be taken by the lugs furthest from the support anchors, Applicants recognize that if such an assumption is made, the frame deflection can, in fact, be larger than initially assumed in that the moment lever arm between the frame embedments and the point of load application would be longer. However, both frame deflection and rotation of the pipe will act to close the gap to opposite or adjacent lugs. (Affidavit at 12-13.)

Applicants investigated the two scenarios which could occur in such instances, <u>viz.</u>, the lugs being stronger than the frame (and thus greater frame deflection) and the frame being stronger than the lugs (inducing small deformations in the lug until other lugs are engaged). For the case in which the frames are weaker than the lugs, Applicants performed a study of idealized frames loaded axially using the four lug arrangement. Two cases were analyzed for this assessment which reflect the situations in which the deflection of the frame would be small and the

situation in which the deflection of the frame could approach Applicants' 1/16" deflection criterion. These frames represent the range of stiffnesses which may occur in the field and, thus, provide evidence of the ability to deflect to permit engagement of additional lugs. For the first case, Applicants determined that the deflection of the frame even with the maximum additional deflection created by the assumption of initial engagement by the outer most lug indicates that the Applicants deflection guideline would not be exceeded. In the second case, it was found that a deflection slightly exceeding 1/16" may be required to bring a second lug in contact with the frame. Any excess loads would be self-limiting and thus when the load is shared by the second lug the deflection no longer increases for a given load. (Affidavit at 13-14.)

To assess the condition in which the frame is stronger than the lug and, thus, lug localized yielding may occur, Applicants analyzed the effect of the maximum localized yielding in the lug and the pipe surface which could occur to bring the additional lugs in contact with the frame. This analysis was performed using a non-linear finite element technique and the computer program NASTRAN. The result of this analyses show that minimal plastic strains, entirely localized at the surface of the pipe and the welds permit a 1/16" deflection from the lugs with no adverse consequence to the lugs. With respect to the stresses on the pipe, Applicants' analysis demonstrates that they would also be acceptable. (Affidavit at 14-15___, Attachment 2).

III. CONCLUSION

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

Respectfully submitted,

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