

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 REGARDING ALLEGED ERRORS MADE IN DETERMINING
DAMPING FACTORS FOR OBE AND SSE LOADING CONDITIONS

I, Robert C. Iotti, having first been duly sworn hereby
depose and state, as follows: I am Chief Engineer of Applied
Physics for Ebasco Services, Inc. I have been retained by Texas
Utilities Electric Company to oversee the assessment of allega-
tions regarding 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 previously submitted an
affidavit in support of Applicants' Motion for Summary
Disposition Regarding Alleged Errors Made in Determining Damping
Factors for OBE and SSE Loading Conditions, filed May 16, 1984.

Q. What is the purpose of this affidavit?

A. I address herein the assertions made by CASE in its August 6, 1984, Answer to Applicants' motion for summary disposition. I will respond separately to CASE's allegations set forth in the Affidavit of Mr. Walsh ("Affidavit") regarding each statement of material fact accompanying Applicants' motion.

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

A. CASE first contends that Applicants have incorrectly interpreted applicable regulatory guidance when we state that piping systems need not be evaluated as "active systems" simply because they contain active components (pumps and valves). CASE apparently believes that if its interpretation is correct then Regulatory Guide 1.61 requires the use of different damping factors for piping analyses than employed by Applicants (Regulatory Guide 1.61, Table 1, note 2). (Affidavit at 1.) CASE's position is premised on an erroneous reading of Regulatory Guide 1.48. CASE claims that the provisions of Regulatory Guide 1.48 governing active pumps and valves require analysis of piping systems as a whole using the same criteria which apply to these active components (Affidavit at 1-2). To the contrary, Regulatory Guide 1.48 establishes separate criteria for piping and active components (see Regulatory Guide 1.48, Sections C.1 and C.4). Further, the definition

of active pumps and valves in the regulatory guide clearly does not include piping.¹ Thus, piping systems should not be considered to be active components and the provision in Regulatory Guide 1.61 (Table 1, note 2) regarding active components is not applicable.

In addition, as a practical matter the provision of Regulatory Guide 1.48 to which CASE refers (Section C.4) does not concern analyses of piping systems. That provision expressly concerns active pumps and valves that are designed by analysis. That analysis is performed in the design of the pump or valve itself by the pump or valve manufacturer and not in the analysis of the piping which is performed by the piping designer. It is the analysis of the pump or valve performed by the manufacturer which is subject to the provision of Regulatory Guide 1.61 (Table 1, note 2) and not the piping system analysis.

CASE also challenges a portion of a statement by Applicants regarding the stringency of the qualification of pumps and valves. Applicants provided this statement in response to an inquiry by CASE during discovery on Applicants' motion. CASE contends that information it received from Cygna contradicts Applicants' statement. In applicable part, Applicants' statement was, as follows:

¹ "Components that must perform a mechanical motion during the course of accomplishing a system safety function." Regulatory Guide 1.48, p. 1.48-7.

valves and pumps are normally specified and procured prior to piping analysis and are qualified for more stringent spectra than the piping.

CASE argues that the material it received indicates that valves were not designed to criteria more stringent than that applied to piping.

The particular valves which were the subject of the letters referenced by CASE were originally specified to be rigid, i.e., natural frequencies of 33 Hz or greater, and to be capable of withstanding accelerations of 2.25g and 1.5g (OBE horizontal and vertical directions, respectively) and 3.5g and 2g for the corresponding SSE accelerations. These accelerations are considerably greater than those achievable at "rigid" frequencies for any damping factor.² Thus, the specifications imposed on the valves at frequencies of 33 Hz or larger are more stringent (larger accelerations) than the requirements that could be derived from piping analyses. CASE apparently did not understand that the acceptance of the valves (following tests) with responses at frequencies lower than rigid does not indicate the ultimate response spectra used to accept the valves are less stringent than

² I am surprised CASE, with its familiarity with tripartite charts (see Testimony of CASE Witness Mark A. Walsh, Attachment A (Tr. 13731)), does not recognize that the stringency of the response spectra used to qualify the valves depends both on frequency and amplitude at that frequency (g-value). Had CASE recognized this, it would have realized that its assertions here were inappropriate.

that employed in the piping analysis. It means only that the ultimate acceptance criteria are less stringent than originally specified for the valves themselves.

- Q. What is your response to CASE's assertion regarding Applicants' second statement of material fact?
- A. CASE argues, based on a statement made by Cygna regarding the damping values used in the analysis of the main steam piping, that Applicants did not use 1 and 2 percent critical damping for small diameter (12" and under) piping systems (Affidavit at 4). Cygna's observation concerned the 8" branch lines off the main steam piping outside containment. Cygna noted Applicants' used a response spectra at 2 and 3 percent damping (applicable to large diameter piping) in the analyses of these systems (Cygna Phase 3 Report, Observation PI-00-03, sheet 1 of 1).

Applicants do use 1 and 2 percent critical damping for small diameter piping analyses. In those instances where a piping stress problem is comprised of both small and large diameter piping, the analysis may be performed in a "coupled" fashion. In those cases, the analyst will normally employ the damping values corresponding to the preponderant portion of the system being analyzed. In the particular system of interest, the major portion of the system is the 32" main steam piping. Therefore, the 2 and 3 percent damping values (applicable to piping greater than 12" in diameter) were used for the entire problem. If the

analysis had been performed in an uncoupled manner, the damping values for the respective pipe sizes would have been used.

Further, we disagree with Cygna's conclusion that the use of damping values for segments of "coupled" piping stress problems that are higher than would be used if the segments were analyzed independently is "extensive." Cygna identified 17 stress problems for Unit 1 with mixed pipe sizes (of 272 total Gibbs & Hill stress problems). Of these, only 3 used damping values greater than what Cygna considered to be appropriate. Upon further review, Cygna acknowledged that there was no design impact from the manner in which Applicants analyzed these problems (Cygna Phase 3 Report, Appendix B, Observation Record Review, sheets 1-3 of 3). Thus, this observation does not involve an "extensive" condition, as Cygna concludes, or indicate a condition contrary to Applicants' statements regarding the use of damping factors, as CASE contends.


- Q. What is your response to CASE's assertions regarding Applicants' third statement of material fact?
- A. CASE disputes, without any basis for doing so, the statement that the damping values used for a particular piping analysis were 1 and 2 percent critical damping. We frankly do not understand the basis for CASE's disagreement. We provided CASE with the computer inputs for the latest running of the stress problem involved. This input clearly

shows that the spectra used for the OBE and SSE correspond to 1 and 2 percent damping, and the 2 and 4 percent were used only to compute the coupling parameter. I have also reviewed the computer input for this stress problem prior to the time of the SIT review (dated March 29, 1981). That computer run employed 1 and 2 percent damping for both the spectra and coupling coefficients. In sum, we have not been able to determine why the SIT reported the 2 and 4 percent damping. Based on my conversations with the Staff it appears there may simply have been a misunderstanding in verbal discussions with the SIT regarding the intent to use in later runs of the stress problem 2 and 4 percent damping for the coupling coefficient.

- Q. What is your response to CASE's comments regarding the fourth statement of material fact?
- A. CASE contends that it is unable to determine from the material attached to Applicants' motion whether the use of 2 and 4 percent damping for the coupling coefficients is conservative. CASE raised this question during a phone conference between the parties. Applicants provided CASE with information demonstrating that use of 2 and 4 percent was conservative. This material demonstrates that the higher the assumed damping parameter, the higher the value of the coupling factor, thus resulting in a conservative

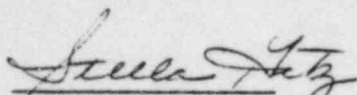
estimate of response. (See Applicants' letter to CASE of June 28, 1984.) CASE does not address this material in its Affidavit.

- Q. Do you have any further comments on CASE's reply to the motion for summary disposition?
- Q. CASE does not dispute either the fifth or sixth statements of material fact. Thus, I have no further comments regarding CASE's answer.



Robert C. Iotti

Sworn before me on this 20th day of September 1984



Notary Public

STELLA GITZ
NOTARY PUBLIC, STATE OF NEW YORK
No. 31-1444786
Qualified in New York County
Commission Expires Mar. 30, 1988

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CERTIFICATE OF SERVICE

I hereby certify that copies of the "Applicants' Reply to CASE's Answer to Applicants' Motion Regarding Alleged Errors Made in Determining Damping Factors for OBE and SSE Loading Conditions," 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 21st day of September, 1984, or by hand delivery (**) on the 24th day of September, 1984.

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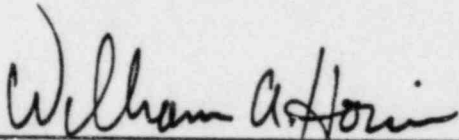
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