

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

TEXAS UTILITIES GENERATING
COMPANY, et al.

(Comanche Peak Steam Electric Station
Station, Units 1 and 2)

Docket Nos. 50-445-1
and 50-446-1

CASE'S PARTIAL ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS
AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING APPLICANTS'
QUALITY ASSURANCE PROGRAM FOR DESIGN OF PIPING AND PIPE SUPPORTS
FOR COMANCHE PEAK STEAM ELECTRIC STATION

in the form of

AFFIDAVIT OF CASE WITNESS JACK DOYLE

Q: Do you have any comment on Applicants' Statement 1, which states:

"Each of the responsible design organizations for piping and supports at Comanche Peak has established procedures to implement the provisions of 10 C.F.R. Part 50, Appendix B and ANSI N45.2.11 to their respective applicable functions in the piping and support design process. (Affidavit Table IV.1)"

A: No -- I am not as concerned with whether a procedure exists as with the fact as to whether or not it is being implemented.

Q: Do you have any comment on Applicants' Statement 2, which states:

"Regulatory Requirements and licensing commitments set forth in the license application are incorporated into design specifications by Gibbs & Hill for Comanche Peak for both piping (Class 2 & 3) and supports. These specifications are transmitted to the responsible design organizations for incorporation in their design process. Similarly, Westinghouse has established a specification for the design of Class 1 (and Class 1 extension) piping. Westinghouse employed the Gibbs & Hill specification in its design of non-Class 1 auxiliary piping. (Affidavit at 16 (G&H), 25-26(1).)"

A: No, for the same reason as in my answer to Statement 1 preceding.

Q: Do you have any comment on Applicants' Statement 3, which states:

"Each of the pipe support design organizations has incorporated the Gibbs & Hill specification applicable to the design of pipe supports into their design process. This specification is incorporated into each organization's designs (including drawings, procedures, instructions and guidelines as appropriate) in accordance with established procedures. (Affidavit at 32-33 (NPS), 39 (ITTG) and 43-44 (PSE).)"

A: No, I do not -- for the same reasons as for answers to Statements 1 and 2 preceding.

Q: Do you have any comment on Applicants' Statement 4, which states:

"Each design organization has implemented design control measures which include verification and/or checking of the adequacy of each design, including the initial design of the piping or support prior to release of the design for construction. These measures include documentation of the design reviewer's findings and correction of the deficiencies by the original designer. Each design organization also requires that the person performing design review may not be the same person who performed the original design, although he may be part of the same organization as the original designer. (Affidavit at 20-22 (G&H), 30 (W), 35-37 (NPSS), 40-41 (ITTG), and 46-48 (PSE).)"

A: Yes, I do. The statement is made that Applicants have measures to find and correct deficiencies by the original designer.

The Cygna Phases 1, 2, and 3 independent review /1/ shows for Phases 1 and 2 that of 9 vendor certified calculations, 6 contained gross errors /2/; for Phase 3, 18 of 22 main steam supports contained gross engineering errors (see CASE's First Motion at page 49); of the 66 component cooling support calculations, 70 per cent contained errors (see CASE's First Motion at page 73). Of the 97 calculations contained

/1/ See Independent Assessment Program for Comanche Peak Steam Electric Station, Prepared for Texas Utilities Services, Inc., Prepared by Cygna Energy Services: Phases 1 and 2, Draft Final Report, November 5, 1983; Phase 3, Final Report, July 16, 1984.

/2/ See CASE's First Motion for Summary Disposition Regarding Certain Aspects of the Implementation of Applicants' Design and QA/QC for Design (hereinafter referred to as CASE's First Motion) -- at page 49

in Cygna Phases 1, 2, and 3 review, at least some (4) had to be repaired to prevent structural failures, not including the generic fixes originally mentioned in Walsh/Doyle (see CASE's First Motion: page 73, answer 14; page 76, item 6; and page 77, item 8).

Q: Do you wish to comment on Applicants' Statement 5, which states:

"During the course of construction of the piping and support system changes in design of supports are virtually unavoidable. Implementation of the changes are governed by established procedures and instructions. The most commonly employed method to implement such changes is through Component Modification Cards ("CMCs"). These changes are subject to design review, verification and approval in accordance with procedures commensurate with the design review process employed in the original design. With respect to design changes not initiated by field modifications, each organization also conducts design reviews of the change in a manner commensurate with the procedures for new designs. The design change control process for each organization provides that the organization which performed the original design to also perform the design review of the design changes. (Affidavit at 50-56.)"

A: No, I would prefer to summarize relative to the contents of Applicants' Affidavit relative to the contents of Applicants' Affidavit in support of their Motion.

The reason is to avoid a lengthy and redundant cruise through the maze of deception by Applicants. The question is simple: Did the Applicants have a QA/QC program in place and, if so, did they implement it?

The answer to the first question is: The Applicants may have had a program, as can be noted from the following:

Applicants and their agents again and again, collectively and individually, assure us that a multi-level checking process existed and that this process was backed up with a critical/independent audit system (see Applicants' Affidavit: Gibbs & Hill at pages 21-23; Westinghouse at pages 30 and 31; NPSI, pages 34 to 36, ITT Grinnell,

pages 39 and 40; PSE at pages 44 to 49).

Applicants even go beyond this and supply two examples of how the system worked in detecting errors (see pages 73 and 74 of Applicants' Affidavit). At page 77, Applicants extend their examples to the guidelines (Section XI Welding) and how it worked there.

Applicants go on to assure us that recurring errors are caught and resolved by their iterative program (see page 72 of Applicants' Affidavit). But this does not conform to reality, since recurring errors are rampant in CPSES calculations. See, for example: weld calculational errors (4); calculations for structural components missing (4); no calculations for snubbers (4); wrong section properties used in calculation (3); to name a few of the repetitive errors found by Cygna in only 22 calculations (see CASE's First Motion at pages 49 and 50).

Q: Are there other areas which indicate Applicants' inability to turn out proper calculations?

A: Aside from the vendor certified drawings, we have in the past had the unique experience of finding calculational errors in Applicants' procedures which, strangely, were always in Applicants' favor. (Of these 6, items 3 and 6 in the following examples were, however, from a vendor certified group; the remaining four were prior to vendor certification.) Errors in Applicants' favor:

- (1) From CASE Exhibit 669B /3/, items 4G and 4H: support CC-1-028-039-S33R, item 6 was a 6" wide flange that had web

/3/ See CASE Exhibit 669B, Attachment to Deposition/Testimony of CASE Witness Jack Doyle, accepted into record at Tr. 3630.

bending problems and this is the one which NRC Staff Witness Dr. Rajan had to back off in his Affidavit; Applicants were wrong in their analysis, and Dr. Rajan was wrong on all of his assumptions, and that one was rebuilt /4/.

- (2) From CASE Exhibit 669B, items 11GG and 11HH: support CC-2-008-709-A43K, item 5 was a 16" diameter diaphragm, and here again Applicants were wrong in their analysis, and the initial analysis by the NRC SIT team was erroneous. The the SIT noticed an error in Applicants equation and a re-evaluation showed that that plate failed, and it had to be modified.
- (3) From CASE Exhibit 669B, item 11TT: support CC-1-107-008-A23R, item 1, Applicants failed to include the torsional stiffness of item 1 and performed a finite element analysis and a physical test to prove the part was marginal but O.K. However, when the SIT requested a reanalysis using the actual stiffness, it turned out that the loads on this particular support increased 660%, which made the marginal deflection problem academic, and the support had to be rebuilt.
- (4) CASE Exhibit 669B, items 11NN and 11-00: support CT-1-008-006-S62K, item 9, a 3/8" plate, was underdesigned. I don't recall anyone's addressing that problem other than us.
- (5) On the upper lateral restraint, Applicants made a gross error in the stiffness calculations which caused a reduction in the

/4/ See 12/13/83 Affidavit of Jai Raj N. Rajan on Support No. CC-1-028-039-S33R, attached to NRC Staff Motion to Reopen Record to Admit the Affidavit of Dr. Jai Raj N. Rajan.

thermal loadings of significant proportions, and by Applicants' equations, the support just barely passed. But for future analysis, to show the adequacy of the upper lateral restraint, Applicants had to resort to a different mathematical procedure than originally used in an effort to show that the support was O.K.

- (6) In addition, in Applicants' analysis of support SI-1-325-002-S32R, they used an erroneous assumption to determine the thermal gradients (plus other erroneous calculational assumptions). The result was that this error allowed Applicants to show the support as having a stress ratio of .9, whereas in reality the support would fail. /5/

With the preceding and paragraph 2 of my answer to Applicants' Statement 4, it is obvious that regardless of what program Applicants had in place, it was not implemented.

Q: Do you wish to answer any points in the affidavit accompanying Applicants' Motion which do not correspond to an item in the Applicants' Statement of Material Facts?

A: Yes, I do. On page 15 of the Affidavit, Applicants quote from an article which appeared in "Power" Magazine, February 1979 (Attachment D to Applicants' Affidavit), and adopt the statement which reads as follows:

/5/ See Attachment A to Affidavit of Applicants' Witness Finneran, attached to Applicants' original Motion for Summary Disposition Regarding Local Displacements and Stresses; see also discussion in CASE's Answer to Applicants' Reply to CASE's Answer to Applicants' Motion for Summary Disposition Regarding Local Displacements and Stresses in the form of Affidavit of CASE Witness Jack Doyle.

"The hanger-design process is not simple. It is complex and tedious, involving many disciplines at the A/E firm, at the hanger manufacturing plant, and at the site. The process is iterative, continuing until the plant goes operational. (Emphasis added.)"

I find two problems with this attempt by Applicants to justify their methodology: (1) The article, which is taken out of context, does not imply that the iterative process extends equally to construction. The article is addressing an iteration of design and layout before construction and problems which are most often the result of space allocation and interferences between the various disciplines. (2) The article in no way implies that, since the process is iterative, errors in engineering fundamentals are therefore acceptable until the completion of the final iteration.

The article, which is describing design processes whereas Applicants are involved in construction iteration, and in many cases, the resolution of these problems was indicated by and the result of Walsh/Doyle and not the result of some master plan by Applicants.

While I and most other engineers accept the design iterative process for nuclear, petrochemical, as well as aerospace and other industries, the idea of construction iteration is indicative of a failure to utilize the design iterative process in the first instance. For example, the design iterative process should be utilized to reveal interferences that may occur in the field by inter-disciplinary review of preliminary designs for all disciplines prior to fabrication and construction. The field is not the arena to uncover interferences.

Q: Do you have any further comments?

A: No, because the above precludes the necessity to answer any of the other items listed by Applicants. Once a program has been exposed as a total failure, why beat a dead horse?

I have read the foregoing affidavit, which was prepared under my personal direction, and it is true and correct to the best of my knowledge and belief.

Jack J. Doyle

Date: Oct 9 1984

STATE OF Massachusetts

COUNTY OF Worcester

On this, the 10th day of October, 1984, personally appeared Jack J. Doyle, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he/she executed the same for the purposes therein expressed.

Subscribed and sworn before me on the 10th day of October, 1984.

Theresa A. Pate
Notary Public in and for the State of Massachusetts

My Commission Expires: _____ MY COMMISSION EXPIRES JANUARY 9, 1987