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 an Operating License)

CASE'S 4TH MOTION FOR SUMMARY DISPOSITION
TO DISQUALIFY THE USE OF SA307 AND SA36 THREADED PARTS

AFFIDAVIT OF CASE WITNESS JACK DOYLE

Q: Do you have any concern over the use of SA36 steel as bolting material?

A: I certainly do.

Q: What is your major concern in this regard?

A: Applicants have introduced a novel design feature, violating the provisions of 10 CFR 50.34(a)(2), identification in the PSAR of unusual or novel design features and (8) identification of those structures requiring research and development to confirm the adequacy of their design.

10 CFR 50.34(a)(2) and (8) state:

"(a) Preliminary safety analysis report. Each application for a construction permit shall include a preliminary safety analysis report. The minimum information to be included shall consist of the following:

"(2) A summary description and discussion of the facility, with special attention to design and operating characteristics, unusual or novel design features, and principal safety considerations." (Emphases added.)

"(8) An identification of those structures, systems, or components of the facility, if any, which require research and development to confirm the adequacy of their design; and identification and description of the research and development program which will be conducted to resolve any safety questions associated with such structures, systems or components; and a schedule of the research and development program showing that such safety questions will be resolved at or before the latest date stated in the application for completion of construction of the facility." (Emphases added.)

Q: What points would you like to make?

A: First, a little background is necessary. For two and a half years, Mark Walsh and I have been pointing out that A307 steel is not to be used for seismic loads (friction joints). In this argument we were backed up by, among other sources, the ASME Code. This code, at section III, Appendix XVII, Table XVII 2461.1-1, Note 1 (see CASE Exhibit 752, copy of which is attached) states, regarding friction type connections loaded in shear, as used by Applicants for cinched-up U-bolts and to a minor degree for bolts in Richmond connections:

"Friction type connections loaded in shear are not permitted."

The reason for this is the unpredictability of this material for dynamic loads, and the prohibition for use of this material by ASME is in compliance with the requirements of 10 CFR Part 50, Criterion II.

Applicants, on the other hand, have been arguing that the threaded material being used was A36 steel and therefore not a subject of Note 1 of the above table (see, for example, Affidavit of Robert C. Iotti and John C. Finneran, Jr. Regarding Board Request for Information Concerning A36 and A307 Steel, attached to Applicants' 12/5/84 Response to Board Memorandum "Information on Composition of A36 and A307 Steel," at pages 2 and 3, copy attached).

Applicants' principle argument consisted of the fact that the testing of the materials was not the same. They state that SA36 steel required both a test for minimum yield point and a test for ultimate tensile strength, while SA307 required only a test for ultimate tensile strength /1/. According to Applicants, the bolting material used at CPSES also has no defined yield point, as was proved by their test program (see Vivirito at Tr. page 6556, cop attached.)

Applicants have never argued that there is a chemical difference in the two materials, and there is not /2/. Their only argument is

/1/ In Applicants' Affidavit, Messrs. Finneran and Iotti refer to certain requirements that are necessary for determining relaxation. In the CMTR (Certified Mill Test Report), no reference is ever made to relaxation for A36 or A307 or A50 or any of the other common mild steels used in construction.

The studies on relaxation are aside from mill tests and have in the past been performed, to the best of my knowledge, only for steels used in bolting friction joints (for example, A325 and A490 high-strength steels, etc.). In these cases, studies have shown that pre-torqued bolts which are torqued to 70% of ultimate will relax to approximately 1/2 of the proof load, which is the principle involved in satisfying the predictability of these joints for dynamic applications. The CMTR inclusion of the yield strength (approximate) is not required for determining bolt relaxation, since this is determined by tests and the application of safety factors.

The Applicants are well aware of this, as may be noted from their statement in answer to questions by the NRC Staff of the meetings of 8/8/84 and 8/9/84 on page 1 where they state:

Section A, U-Bolt Cinching, (see attached copy), page 1:

"a. There is scant, if any, data available on strain relaxation properties of SA36 material."

/2/ Again the Applicants are attempting to misrepresent the facts. Applicants are well aware that for the material being discussed (for example, U-bolts which are bent unheaded threaded rods and unheaded anchor bolts), the material referred to as SA-307 is in fact SA-36 material, as may be noted from the following documents supplied by Applicants (attached to Applicants' 1/7/84 Motion for Reconsideration of Licensing Board's Memorandum (Reopening Discovery; Misleading Statement): (continued on next page)

that the tests for yield are not required to be performed on the A307 steel. The difference in the materials generally (threaded materials notwithstanding) involves only one fact and that is, for A36 the approximate yield is known (when you have mill testing) and for A307 it is not. The fact that both have a yield point is not in question.

As far as Applicants' testing of the bolt material, the testing was performed to show that the bolts could take a certain static load.

/2/ (continued from preceding page):

In Attachment B (see copy attached), which is in reference to ASTM A307 at Note 1.3, the following code statement is made:

> "Nonheaded anchor bolts, either straight or bent, to be used for structural anchorage purposes, shall conform to the requirements of Specification A 36 with tension tests to be made on the bolt body or on the bar stock used for making the anchor bolts." (Underscored on the copy supplied by Applicants.)

Attachment D (see copy attached), which is the ASME specification SA-307: at section 1.3, the code referenced is almost identical to the ASTM 307 specification quoted above:

> "Nonheaded anchor bolts, either straight or bent, to be used for structural anchorage purposes, shall conform to the requirements of ASTM Specification A 36, for Structural Steel, with tension tests to be made on the bolt body or on the bar stock used for making the anchor bolts."

From the above-quoted code provisions from both the ASTM for commercial use or the ASME for nuclear power plants, there is no doubt that SA-307 and A-36 are identical, since the SA-307 for the bolts under discussion is made from A-36. Therefore, the following statement by Applicants is a gross misrepresentation of the facts (page 3 of the Affidavit of Robert C. Iotti and John C. Finneran, Jr. Regarding Board Request for Information Concerning A36 and A307 Steel, attached to Applicants' 12/5/84 Response to Board Memorandum (Information on Composition of A36 and A307 Steel); see attached copy):

> "In summary, it is not appropriate, therefore, to interchange the two steels as CASE has done."

(NOTE BY CASE: The preceding footnote 2 was added at the request of Mr. Doyle by telephone after he had received a copy of the Applicants' 1/7/84 (sic; should be 1/7/85) Motion for Reconsideration of Licensing Board's Memorandum (Reopening Discovery; Misleading Statement).)

The test did not show whether the joints could sustain seismic loads nor what effect the non-friction joint would have on the dynamics of the system itself (see, for instance, NRC Staff Witness Dr. Chen at Tr. page 6546 (copy attached), where he states that tests for one-time loads are not applicable to cyclic loading.) Therefore, without accurate dynamic tests for both the bolt material and the infrastructural effects (pipe stress analysis, for example), Applicants are using a bolting material which is only qualified for static loads. These joints present an unknown quantity as relates to the dynamics of the total system and are therefore not in compliance with 10 CFR Part 50, Appendix A, Criteria I and II.

Q: For these reasons, therefore, do you believe that the bolting materials used at CPSES are in noncompliance with the law?

A: For the above reasons, yes. However, these arguments are really academic when one looks to the codes.

Q: What do you mean by this?

A: To all but somewhat knowledgeable persons involved in engineering, it was obvious that to cope with dynamic loads, the joints must be predictable; that is, slippage must be a controlled criteria. With the introduction of dynamic analysis by Structural Engineers and Architects of California (SEAOC) for structures in California (which is often used as a guide in other seismically active areas), the AISC in the latest revision of their code, effective November 1978, codified their position on bolting materials. And in this, they have prohibited the

use of bolts and threaded materials made of SA307 and A36 steels (among other materials) subjected to other than static loads. See Table 1.5.2.1, Threaded Parts, AISC 8th Edition, page 5-24 (copy of which is attached). The only bolting materials commonly used for dynamic loading conditions are A325 and A490.

Q: But isn't it true that Applicants are only committed to the 7th Edition, and the statements being made are from the 8th Edition?

A: That is true, but the logic which required the change existed even prior to the 7th Edition if you were doing dynamic analysis. Therefore, the exclusion of these materials for nuclear power plants dynamically analyzed is required under the provisions of 10 CFR Part 50, Appendix A, Criterion I. Additionally, the provisions of ASME, Section III, Appendix XVII, Table XVII-2461.1-1, Note 1, still apply (see Board's 12/28/83 Memorandum and Order (Quality Assurance for Design), at pages 27 and 28).

During the time prior to the 8th Edition, the AISC Code addresses loading in terms of static application; that is, even for structures which included earthquake considerations, the earthquake load was assumed to be an equivalent static horizontal load based on KCZW (dynamic derivation of loads was not utilized). In the case of nuclear power plants, the earthquake loads are based on the response spectra and damping factors, in which case the predictability of the joint is required. Otherwise, both the response spectra and the damping factors are also unpredictable.

Beyond this, Applicants have apparently amended their FSAR to include both the 7th and 8th Editions of the AISC Code (see Transcript of meeting between Cygna Energy Services and the NRC Technical Review Team, 12/20/84, page 80, lines 6 through 9, copy attached.)

Q: Is that all that you have to say on this matter?

A: No, I would like to make one final point. If you build the perfect nuclear structure, perfect piping systems, and perfect pipe supports, and then you connect these items with unpredictable bolting materials, you have a total system which is no longer perfect as independent components and which is now, as a system, unpredictable; and all of the semantics, all of the legal loopholes, or all of the deceptive verbage will not alter this fact.

CPSES is less qualified for dynamic events than a California factory designed under SEAOC and, as a result, the health and safety of the public is in jeopardy.

Q: What must Applicants do if they cannot use A307 or A36 steel for bolted connections?

A: They have to establish a friction joint, to start with, with materials which are acceptable under dynamic loading conditions, to at least bring the plant up to the same level of quality as a California pig sty.

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: Dec 31, 1984

STATE OF Massachusetts

COUNTY OF Worcester

On this, the 31 day of December, 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 31st day of December, 1984.

Notary Public in and for the State of Massachusetts

My Commission Expires: Jan 3, 1986