

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of

TEXAS UTILITIES GENERATING
COMPANY, et al.

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

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

CASE'S THIRD MOTION FOR SUMMARY DISPOSITION,
REGARDING LACK OF INDEPENDENCE AND/OR CREDIBILITY OF CYGNA

in the form of

AFFIDAVIT OF CASE WITNESS JACK DOYLE

The Cygna Report /1/ forcefully conveys the idea that the contents are the firm position of Cygna as relates to the methodology utilized to build Comanche Peak.

Appearances can be deceiving, however, and from a time history, I am sure that we have a problem of appearance in this case. For example, over

/1/ No. TR-83090-01, Draft Final Report, Independent Assessment Program for Comanche Peak Steam Electric Station (Phases 1 and 2), Prepared for Texas Utilities Services, Inc., Prepared by Cygna Energy Services, November 5, 1983; and

No. TR-84042-01, Final Report, Independent Assessment Program of Comanche Peak Steam Electric Station (Phase 3), Prepared for Texas Utilities Generating Company, Prepared by Cygna Energy Services, July 16, 1984.

It should be noted that this Affidavit does not include discussion regarding No. TR-83090-01, Rev. 0, Final Report, Independent Assessment Program for Comanche Peak Steam Electric Station, Prepared for Texas Utilities Services, Inc., Prepared by Cygna Energy Services, October 12, 1984, which has just been received (at the time of this Affidavit) and is currently under review by CASE and its witnesses.

and over, Cygna bases their write-off of problems with the caveat that Applicants answered the question satisfactorily, but no analysis is made of why so many of Applicants' answers are flawed.

More important are the vacillations of Cygna. I find it next to impossible to determine the fixity of any position taken by Cygna. The following examples will clarify my position:

(1) Cygna's position on the use of U-bolts as clamps was firmly established by their Project Manager, Ms. Williams, when she stated at Tr. 9796:

"But it's also standard practice and supplied as standard materials or components from manufacturers in clamps which are also used for this very same application. It's standard practice within the industry to buy a clamp that is made of the same materials as what we're talking about here."

But later Ms. Williams reversed her position when she stated in answer to a question by Judge Bloch (Tr. 12,421):

"JUDGE BLOCH: Do you know, in the more general point, whether it is customary to cinch up U-bolts around pipes?"

"WITNESS WILLIAMS: We're not aware of other applications like that."

And again later, while discussing "basic box frame and U-bolt, clip angle, clamp, support, assemblage," Ms. Williams stated (Tr. 13,027):

"A: In my experience, I have not seen other examples of that particular configuration."

At Tr. 13,028, Judge Bloch asks Cygna's Dr. Bjorkman if his experience was the same or otherwise; Dr. Bjorkman stated: "Mine is the same."

(2) In reference to the adequacy of the clip angle/U-bolt arrangement, Ms. Williams was certain of the adequacy to the point of being angered

because we kept on asking her questions on the subject. Some of her statements relative to Cygna's firm position on this issue were as follows. There is no doubt as to which specific support is being discussed (support No. SI-1-325-002-S32R, CASE Exhibit 891, expanded and renumbered CASE Exhibit 928; see Tr. 9786) when the subject starts out as it did at Tr. 9787 by me, "The support before you is . . ." Also, excerpted from Tr. 9789-9791:

"BY MR. DOYLE:

"Q: Therefore the U-bolt and the two angles, which are Item 15, are critical to that support? . . . It's a 4 by 4 by 1/4-inch angle.

"A: (Witness Williams) So the question was, is the U-bolt critical and the bolting of the U-bolt critical? The answer is yes.

"BY MR. DOYLE:

"On the fourth page of 891, which is Page 5 of 13 in the calculations, the last sentence states, 'It is assumed that the U-bolt will prevent rotation and will not see any load.'"

In that calculation, there was no analysis for either the U-bolt or the clamp angles which retain the U-bolt. The basic position of Cygna was predicated on the adequacy of the clip/U-bolt assembly to maintain stability; see Tr. 9787:

"WITNESS WILLIAMS: In this picture, he has asked me, if you take away the U-bolt, will it be stable? And my answer was no."

At Tr. 9788, the following was discussed:

"JUDGE BLOCH: . . . Will this support be stable if the U-bolt is there but not cinched up?

"WITNESS WILLIAMS: No. If you had clearance around the U-bolt, you might as well not have the U-bolt.

"JUDGE BLOCH: Okay. So for the support to be stable, the U-bolt must be cinched up.

"WITNESS WILLIAMS: Yes."

At Tr. 9791:

"JUDGE BLOCH: Well, would it be correct to assume that the U-bolt will prevent rotation without calculations?

"WITNESS WILLIAMS: We believe so."

At Tr. 9793:

"JUDGE BLOCH: So the question is, what was the basis for determining that this support was stable. If you don't know, say you don't know.

"WITNESS WILLIAMS: I will tell you what I know of the basis, that we believe the U-bolt will develop a sufficient clamping force to resist the rotation. . .

"JUDGE BLOCH: Mr. Doyle has testified previously that he does not believe that it will provide sufficient clamping force. He has presented us with some calculations and findings that were filed earlier, so I guess we need a little bit more to know why you are satisfied that it will develop enough clamping force.

"WITNESS WILLIAMS: We feel that because they are constructed of the same materials, and we also believe we can demonstrate this through analysis."

At Tr. 9801:

"JUDGE BLOCH: How do you know that you looked at whether or not this was an intended use by the manufacturer? What lets you know that?

"WITNESS WILLIAMS: I guess I'm not saying whether we asked an intended use. We are saying we felt it would develop sufficient strength to resist the rotation, and on that basis we felt it was acceptable."

The matter of the clip/U-bolt assembly continued. Tr. 9803:

"MS. WILLIAMS: We have evaluated and have a position on each one of these issues. . . "

Still defending the adequacy of the clip/U-bolt assembly, Ms. Williams stated at Tr. 9810:

"WITNESS WILLIAMS: There are hand calculations, notes, field notes that people run checks on . . .

". . . In other words, the reviewer does his own calculation and justifies it in his mind and the team members' mind. . . "

At Tr. 9812:

"WITNESS WILLIAMS: . . . I think it doesn't matter how many engineers I parade up here; we are going to get down to a difference of opinion, and the only way we are going to be able to justify that is to produce some calculations that everyone can evaluate. A good example of that is the U-bolts. There isn't anybody else I can bring up on the stand right now who is going to tell you anything different than what I have already told you."

At Tr. 9828, still on the clip/U-bolt assembly:

"WITNESS WILLIAMS: We did have some discussion on our judgment on the matter, and we felt that we could demonstrate that it was acceptable."

I won't go any further on this point, because I am certain that the message is clear. Cygna's position was as follows:

- (a) The U-bolt was critical to stability.
- (b) The U-bolt/clip assembly was evaluated.
- (c) The U-bolt/clip assembly was adequate.
- (d) During team discussion, Ms. Williams evaluated the engineers' judgement.
- (e) Weighing the evidence, Cygna judged the clip/U-bolt assembly as adequate.

There is more to go with what has already been shown from the testimony, but additions would be redundant. However, the plot continues at Tr. 9831-9843.

Within about three months, Cygna's position changed. This was a result of a Board Order during the hearings which (after some discussion) cut off Cygna's February 1984 testimony and required CASE to, in effect, prefile their cross-examination of Cygna (see Tr. 9908-9911, 10341-10347). It was

the result of this prefiled cross-examination that Cygna was made aware that the clip angle for the clip/U-bolt assembly failed and therefore the assembly failed.

The new position of Cygna came forth during the April 1984 hearings and, summarized, was as follows, which is in contradiction to Ms. Williams' testimony of February 1984, excerpts of which are shown in the preceding. With the comments of Ms. Williams in mind (at Tr. 9787 and 9791, as shown on pages 3 and 4 of this Affidavit), wherein she discusses clamping forces, which for U-bolts can only be achieved by cinching, to one degree or another -- consider the contradictory comments made at Tr. 12,324/10-12,325/19:

"BY MR. PIGOTT:

"Q. Ms. Williams, would you direct your attention to page 1 of your prepared direct testimony, which sets forth Doyle Question Number 1, in the Cygna response? Would you explain for us the manner in which Cygna moved or answered this question? And I would ask that you include not simply the drafting of the response, but the history of your review, and how you got to this particular response?

"Let me break it up and make it a little easier.

"Would you describe for us the scope of the Cygna review with respect to U-bolts found in -- let's take Exhibit -- well, any one of the 891, 894, or 897 and how you treated that during the course of your review?

"JUDGE BLOCH: Okay, this is the review up to the time of the hearing?

"MR. PIGOTT: This is the review leading to the draft report.

"WITNESS WILLIAMS: I reviewed them as if they were pipe clamps.

"BY MR. PIGOTT:

"Q. Well, first of all you detected the fact that there were U-bolts used in this particular system?

"A. (Witness Williams) Yes, we did.

"Q. And how did you analyze those U-bolts?

"A. We analyzed them as if they functioned as pipe clamps and evaluated the support accordingly.

"Q. And did you find the U-bolts to be a satisfactory method of support?

"A. At the time of the review we felt that they were, yes.

"Q. And has anything come to your attention that -- well, what is your current opinion on that?

"A. We have since learned that there are installation procedures requiring cinching and find that that is cause for some concern."

. . . and at Tr. 12,344/14-12,345/3:

"JUDGE BLOCH: Ms. Williams, how do you feel now about whether you made a sound judgment in the initial report when you assumed that a U-bolt was a pipe clamp? Is that a valid design judgment?

"WITNESS WILLIAMS: I think that these analyses clearly indicate that more work is required.

"JUDGE BLOCH: Was there a sound basis at the time you made the judgment for deciding the U-bolt was a pipe clamp?

"WITNESS WILLIAMS: Yes. I talked to the reviewers, I've looked at the drawings, I looked at the information that was made available to them at the time, and I think that they made a reasonable judgment. This is new information. We have new analyses, and we do think it has to be pursued further." (Emphasis added.)

But if cinching is new information, how does she explain the clamping forces?

Continuing at Tr. 12,699:

(Referring to Tr. pages 9791, 9793 and 9794)

"BY MR. DOYLE:

"Q: Was your position at that time that the U-bolt clip angle arrangement would develop sufficient clamping force to prevent rotation of the box frame about the axis of the pipe?

"A: (Witness Williams) I don't see those exact words here. What I see is a discussion of U-bolts and the fact that my understanding was that our reviewers considered them to be clamps. And then there's a statement here where I say that I will explain what I know of the situation, and we discuss U-bolts and the fact that they can develop sufficient clamping forces to resist rotation.

"I don't see any specific evaluation of the type of detail that we have responded to in Doyle #7."

. . . But they existed (see preceding citations), and as to the discussion being general, it was specific; see the first paragraph of this item (top of page 3 preceding).

The next several transcript pages are an example of my ineptitude (at this point I knew she was deceiving the Board, since the two days of testimony to which I was referring revolved entirely around support SI-1-325-002-S32R (CASE Exhibit 928, see Tr. 9786), but I didn't know how to tie it back into the vast number of pages of testimony involved) in tying down legal points, particularly when the semantics of legal niceties are involved during the short period while cross-examining.

At Tr. 12,712/4-23, the following discussion took place:

"JUDGE JORDAN: I see, and this is the way the system was designed to operate, that the box frame itself would provide clamping force adequate to prevent any motion. Is that the design of the plant?"

"WITNESS BJORKMAN: From looking at the drawing, it appears that way.

"WITNESS WILLIAMS: I don't think we can really speculate on what the designer was thinking, but the calculation does show the addition of the U-bolt to prevent rotation. We evaluated it without the U-bolt because we didn't think that was a substantial approach to the problem.

"JUDGE JORDAN: It's your opinion then, even if the U-bolt was left off, the frame itself would provide adequate support for the pipe?"

"WITNESS WILLIAMS: That's how we evaluated it. I'm not sure that, to be conservative, they shouldn't approach the design in a more traditional manner. There's a lot better designs for that particular application and I don't think that's the approach we would take. However, we accepted it as adequate." (Emphasis added.)

The above exchange with Judge Jordan is incompatible with the exchange with Judge Bloch at Tr. 9787, as shown on page 3 of this affidavit (wherein Ms. Williams indicated that for the support to be stable, the U-bolt must be cinched up).

At Tr. 12,702-12,703:

"BY MR. DOYLE:

"Q: Referring to your answer to Doyle Number 7, you are now in a position where you feel that the clip angle is insufficient to resist or to support the pretensioning forces that are exerted? Is this not correct?

"A: (Witness Williams) They will not support an 80 pound torque."

At Tr. 12,700-12,701, Ms. Williams is still trying to convince everyone that her previous testimony dealt with U-bolts generally being used as clamps, and not related to the specific question of clip/U-bolt arrangements as shown on the document (regarding support No. SI-1-325-002-S32R, CASE Exhibit 891, expanded and renumbered CASE Exhibit 928; see Tr. 9/86); see also Tr. 9790 and 9791, particularly 9790/21-25 and 9791/1. Tr. 12,700-12,701:

"BY MR. DOYLE:

"Q: Is there a change in position between the transcript of the February hearing and the testimony of today?

"A: (Witness Williams) The sections of the transcript that I have read thus far deal with U-bolts and the analogy to clamps. It doesn't say U-bolt/clip angle arrangement, first point.

"Second point is that the only thing that has changed from the time that I provided this testimony, in response to your question, is discussions with our reviewers to understand exactly what internal discussions took place and their thinking on assessing the adequacy of the support.

"It's a level of detail greater and greater understanding on my part, but not necessarily a change."

Any quantification by Cygna of the specific U-bolt under discussion is erroneous at best, because the support for the U-bolt failed.

At Tr. 12,712, Ms. Williams states ". . . We evaluated it without the U-bolt because we didn't think that was a substantial approach to that problem." This is a total reversal from the answers she gave at Tr. 9787, 9788, 9791, 9793, 9801, and 9812 (see pages 3 through 5 of this Affidavit).

Ms. Williams finally conceded the fact that the U-bolt/clip assembly does not work; Tr. 12,705-12,706:

"Q: (By Mr. Doyle) But you do agree that the clip angle is incapable of resisting the support or the pre-torquing of the U-bolt? Is this not correct?

"A: (Witness Williams) Yes. We agree with that. And we have stated the thinking of the reviewers, in assessing the adequacy of that support, as part of response to Doyle Question Number 7.

"Q: And this U-bolt/clip arrangement was instituted by the Applicant as a means of preventing instability in that particular support? Is this not correct?

"A: Yes, that's what the calculation says.

"Q: The effort by the designer was inadequate to perform its function? Is this not correct?

"JUDGE BLOCH: The question is inadequate to assure that it would perform its function?

"MR. DOYLE: That's correct.

"WITNESS WILLIAMS: You're referring to the U-bolt there only, not the support -- in the support's ability, as a component, to perform its intended function?

"BY MR. DOYLE:

"Q: For the clip angle/U-bolt arrangement.

"A: (WITNESS WILLIAMS) Again, we're not commenting on that. We're saying we felt the support would perform its intended function. Now we looked at the clip angle subsequent to the review and during the review. We feel that they are a weak (sic) link in that design and not a good way to address the instability problem, if that's what they were attempting to do as stated in the calculation.

"However, we felt the support would adequately perform the function.

"Q: And what do you base that judgment on?

"A: That judgment is stated in our response, which is that sufficient friction forces will develop between the pipe and the box frame.

"Q: And how are these friction forces developed, if there is no clamping action afforded by the box frame?

"A: It's just based on zero clearance heating up the pipe. We don't think it's a good design. We've stated that in our response, as well."

It is clear from examining the two transcripts that the new (April 1984) position of Cygna is as follows:

- (a) The clip angle fails.
- (b) Cygna knew the clip angle failed.
- (c) It is friction on the box frame which stabilizes the support.

(d) The original position of U-bolt adequacy was never entered in the record, but rather a philosophical discussion on the general use of U-bolts vs. clamps was carried on by CASE and Cygna for two days.

While Ms. Williams' ability to dance around semantics is obvious, her credibility is not.

(3) In answering Doyle Question No. 12, in Ms. Williams' prefiled testimony dated March 18, 1984 (Answer re: Doyle Question No. 12, page 2), Ms. Williams dismissed the potential problems with double struts and double snubbers by stating that:

"Supports cannot be installed to these tolerances. Further, support hardware is generally not supplied to such detailed dimensions. For example, there are gaps of 0.02 inches around each support pin which can accomodate (sic) two-thirds of this motion. . . "

I note that in Cygna's prefiled testimony dated April 12, 1984 (page 19, Re: Doyle Question #6) the reason why coupling was no problem had been changed. This was after CASE critiqued the original excuse. When questioned on this point, Ms. Williams stated (Tr. 12,729):

"Yes, I'm aware of that statement and in the hast (sic) of trying to get this product out I didn't catch, but I don't agree with it."

However, during cross-examination, Ms. Williams went back to the gap theory to explain why two axial snubbers did not have to be modelled to take the pipe-induced moments; see Tr. 12,772:

". . . But obviously, when you place these one-way restraints, you're going to limit the rotation, unless you assume some gaps there or you're getting extremely complex."

See also Tr. 12,782-12,783:

"JUDGE BLOCH: And using that technique, do you exceed code allowables?"

"WITNESS WILLIAMS: The numbers that came out of that run exceeded the manufacturer's allowables for the struts. But again, you're still basing that on analytical assumptions and we're saying that there are enough variables involved and there's enough discussion within the industry as to whether you need to evolve to that level of detail to get an accurate enough assessment of the adequacy of the adequacy of the (sic) piping."

Ms. Williams and Cygna reversed their position /2/; see Phase 3 Cygna Report, Volume 1, Appendix G, Observation No. PS-03, Observation Record Review, Attachment A, Page 1 of 1:

2.0 Resolution

"In their initial response dated April 19, 1984, TUGCO had stated that the effect is negligible due to the clearances in the snubber or strut. This does not consider the test results from the Energy Technology Engineering Center report NUREG/CR-2175, which shows that mismatches in clearances on the components in a trapeze support can lead to load imbalance by themselves. Nor does it consider that pipe support vendors normally size a riser clamp for the full load on one side, when used with struts, due to thermal rotation. . ."

Although Cygna could have included the fact that the full load per strut concept is also a code requirement (ANSI B31.1 121.3.1(c) and MSS SP-69 12.1 requires a rigid support), they have, by the above quoted statement, reversed their field one more time.

/2/ NOTE BY CASE: CASE is not certain what Cygna's present position is regarding this open item inasmuch as we have recently received a stack about 12 inches deep from Cygna, which we have not yet copied and sent to Mr. Doyle for his review at the time of this Affidavit. We also do not at this time know whether or not this or other recent information from Cygna bears on this particular question.

(4) Cygna produced a finite element analysis to determine the effects of thermal expansion, and mechanical loads on box frames used as clamps. The results of this finite analysis indicated that the stress levels were very high. Tr. 12,724-12,725:

"JUDGE BLOCH: You say 'quickly perusing.' Are you confident that what you are going to say is accurate? I don't want you to say something that's not accurate.

"WITNESS BJORKMAN: The problem is, I want to make sure I identify the exact node point in the mode'.

"(Witness Bjorkman refers to the document.)

"Okay. I believe I have identified the -- I just wanted to make sure that the number reported for the -- for the equivalent stress was the same number that would be reported for the stress intensity. It looks like they are.

"In the model, it appears that the most highly stressed element is Element 122. The equivalent stress, the maximum equivalent stress in that element is 37,500 pounds, so it has exceeded yield by approximately 1500 pounds." (Emphasis added.)

"Now that is not the true yield that we are using. We are using 36,000 psi as the yield strength. That's what I am using because of the steel which is being used for the tube steel, SA-500 steel, but that reduction in allowable stress is really the reduction in allowable stress at the weld due to the heating of the weld. But I am conservatively assuming that it is the yield stress for the entire --

"JUDGE BLOCH: If you went up to the old value, you are still over that, aren't you?

"WITNESS BJORKMAN: No. The old value is up in the 40s somewhere."

Another statement by Dr. Bjorkman which points out the enormity of the effects can be found at Tr. 12,711/21-12,712/3:

"WITNESS BJORKMAN: Oh yes. We have some calculations to show what the actual clamping forces are and they're quite large. It's on the order of -- for this particular case, with thermal expansion, the clamping forces are on the order of -- I'm not going to refer to the specific calculation, I'm just going to do it from memory. I believe the calculation has been submitted, but we're talking somewhere on the order of 70 to 75,000 pounds of clamping force here."

The fact that this analysis was fairly representative of reality is stated by Dr. Bjorkman at Tr. 12,882/1-8:

"WITNESS BJORKMAN: This particular frame and pipe model probably doesn't require that much more refinement to be able to utilize it. In the case of the U-bolt and the pipe, yes, it requires a significant amount of additional refinement. So in this particular problem, I don't think the level of refinement is great. It's to incorporate additional loads in the problem, the right allowables, check welds, et cetera."

From the above, it is obvious that the box frame strut concept presents serious and as yet unknown problems. The above information was discarded out-of-hand by Cygna in favor of a Mickey Mouse equation by Applicants (see Cygna Phase 3 Report, Volume 2, Note 16).

In reference to Note 16: The equation is fundamentally wrong in several critical areas, specifically: the manner of determining the thermal gradients is incorrect; the failure to include energy transfer barriers resulted in erroneous thermal sources for the box frame; the time element which is critical to conclusions of temperature differentials was not considered by Applicants. See also my Affidavit attached to CASE's 10/9/84 Answer to Applicants' Reply to CASE's Answer to Applicants' Motion for Summary Disposition Regarding Local Displacements and Stresses.

It is amazing to me how critical and precise Applicants, NRC Staff, and Cygna can be when equations threaten their position: for example, Applicants' Witness Mr. Vivirito on the upper lateral restraint (Tr. 6042-6056) where Mr. Vivirito introduces concrete crunching and variations in Young's modulus, etc., as an excuse why equations do not have to be precise; beyond this, Dr. Iotti never used Gibbs & Hill procedure when he approached the upper lateral restraint but went to a whole new procedure involving almost half the plant (which would be similar to using the walls and curtain

wall in order to lower the stress for an internal beam on the 18th floor of the World Trade Center); and Cygna's Dr. Bjorkman on the finite element analysis for the cinched up U-bolts (Tr. 12,954-13,002), where Dr. Bjorkman critiques and all but discards the months of work he did in an effort to determine the stresses on the pipe and the U-bolt. On the other hand, if any equation, regardless of flaws, indicates a favorable result for Applicants' position, the blind acceptance is immediate, total, and overwhelming.

But all other factors aside, we have another example of vacillation, to say the least:

(5) Cygna did a great deal of work on trying to determine the effects of prestressing, thermal expansion, and mechanical loads on the cinched-down U-bolt problem.

The results of their lengthy work led Cygna to conclude that serious problems existed (Tr. 12,331/5-12,332/25):

"WITNESS BJORKMAN: The copies which have not been distributed so far relate to the five foot pound cinching force. Those computer runs have not been distributed yet. They will be. And the summary of the entire calculation has not been distributed yet, which I have in my hand.

"The results indicate that in the case of the most severe pipe -- or the condition that we judge to be the worst case -- was the 8-inch pipe which was thinner walled. And the results indicate that for a 5 foot pound cinching torque, that the U-bolt, during the cinching process itself, would exceed what you would consider to be the normal allowable in bending. It is not above yield, but it is above the allowable stress. This is with 5 foot pounds.

"JUDGE BLOCH: So by inference, it does obviously exceed with the higher torque.

"WITNESS BJORKMAN: Yes, with the higher torque it would obviously exceed it. Since it is a non-linear problem, it does not -- if we go from 5 to 10, we do not get a doubling of the force on the U-bolt. In fact, it's quite non-linear. In fact, when you go to 25, it only increases by about 8 percent, when (sic) go from 5 to 25 foot pounds. So it is highly non-linear.

"JUDGE JORDAN: Do you have a feeling for why that is?

"WITNESS BJORKMAN: Yes. Because the gaps are closing around the pipe, and the bending moments -- the gaps are closing, the U-bolt is now coming in contact with more pipe, and the very top of the U-bolt that now has high bending stresses in it is now not -- the additional loads are not going into that portion of the pipe but are now being distributed more or less at the points that are just coming in contact around the pipe.

"JUDGE JORDAN: I see. So you first considered essentially a point contact with no load, and then as you put on various tensioning loads you have bending of the U-bolt and further contact with the pipe.

"WITNESS BJORKMAN: Correct. That is correct.

"JUDGE JORDAN: I see. Thank you.

"JUDGE BLOCH: Did you also look at the localized stress on the pipe?

"WITNESS BJORKMAN: Yes, we did.

"JUDGE BLOCH: What did that show?

"WITNESS BJORKMAN: For the case of the preload alone, a 5 foot pound cinching torque produced a stress intensity of a little under 6 ksi, or 6000 pounds per square inch."

Dr. Bjorkman concluded that more work was required to clarify the effects on U-bolts (see Tr. 13,002). But I am certain that Dr. Bjorkman was not referring to pencilwhipping.

However, Cygna backed off from their own research on this matter in favor of Applicants' math/test gyrations; see Phase 3 Cygna Report, Volume 2, Appendix J, Note 12.

I will not become overly involved with Note 12 of the Phase 3 Cygna Report because Cygna, in the report at Note 12, considers this to be an open item.

However, Cygna does reveal their desire to accept this note at the end of the test/analysis program, and this without critical review; see Volume 2, Appendix J, Note 12, pages 6 and 7 of 9, which states at page 7:

"These represent a broad range of piping and material combinations at CPSES and would provide assurance that the worst combination of wall thickness, pipe size, and temperature effects have been considered."

First, this sample represents only a minor portion of the vast number of sizes, configurations, and materials used. For example, the precise wall thickness of pipe (not to mention those pipes with minimum wall violation) are not considered.

More important, the Applicants' tests and analysis indicate that the procedures used in these tests and analysis were loose, to say the least. For example: The finite element analysis (see Attachment 3, pages 11 to 14) indicates that the cross pieces used in the tests were as follows -- for the 4-inch diameter pipe, the plate is 3/4" thick by 3.0" wide, and for the 10" diameter pipe, the cross piece used was 1-1/4" thick x 4" wide.

The reality (which is included for these examples in the same finite analysis; see Attachment 3, Appendix 1) is that the actual dimensions vary. For example, the drawings in Appendix 1 indicate that one of the cross beam examples is smaller and therefore not represented by the tests.

The drawings show the following: For the 4" diameter pipe, the cross piece (Item 11) is actually 1/4" thick x 3" wide instead of the 3/4" thick by 4" wide member used in the finite analysis.

Cygna's statement of the representative nature of the tests and analysis does not mean much when Applicants' own material in a single document contradicts the position of Cygna.

There are other examples of this inconsistency. One may be found in the Phase 3 Cygna Report, Volume 3, PS 069, support MS-1-001-003-S72R, which has a cross piece made up of a TS 4 x 8 x 3/8" wall with 1 x 4" plates top

and bottom, and not the 6 x 8 x 1/2" tube used in the finite analysis which introduces a considerable nonconservatism for the output.

I point this out to indicate Cygna's eagerness to accept the Applicants' excuses to justify a fait accompli -- any excuse.

And here we go again -- Cygna backs off from their research in favor of Applicants' justification.

(6) Finally we come to the great reversal -- with 72 per cent of the calculations in Phases 1 and 2, and Volumes 2 and 3 of the Phase 3 review containing erroneous equations or missing equations, Cygna has seen fit to write the errors off (notwithstanding the fact that three supports exhibited structural failure).

It was not that long ago that Cygna was aware of the fact that even minor errors, if numerous, represented a significant problem; see Ms. Williams at Tr. 12,377/17-20:

"JUDGE BLOCH: Would a pattern of missing equations and truncated equations have some possible implication, even though on a particular design it didn't?

"WITNESS WILLIAMS: Yes."

And at Tr. 12,340/1-18:

"WITNESS WILLIAMS: This information on the 80 foot pound cinching was not part of the design documents that we were looking at.

"JUDGE BLOCH: Isn't that in itself requiring an observation of an improper design document?

"WITNESS WILLIAMS: No, because we didn't know it was an omission to look for. In hindsight now, we know this information --

"JUDGE BLOCH: Okay. And then as soon as you found it was omitted, shouldn't it have become an observation right then. As soon as you found that the document did not have all of the design criteria for assuring the safety of the structure, shouldn't it have been an observation right then?

"WITNESS WILLIAMS: The question is should we write one now?

"JUDGE BLOCH: Right.

"WITNESS WILLIAMS: Yes."

And at Tr. 12,381/16-22:

"BY MR. DOYLE:

"Q. Should equations be truncated on a calculation without explanation?

"A. (Witness Williams) No, not in the ideal situation.

"Q. According to N-45.2.11, is this allowed?

"A. You should have a thorough set of documentation of your analyses."

And from my cross-examination testimony at Tr. 13,055/7-13,056/16:

"BY MR. PIGOTT:

"Q. So potentially you would say that one of these -- to use your word -- miniscule allegations of error may, in fact, be more significant than it appears on the surface?

"A. [Mr. Doyle] No, no, that's not what I said.

"Q. Not at all?

"A. No.

"JUDGE BLOCH: He's worried about the cumulative effect.

"MR. PIGOTT: I understand."

Q: What do you conclude from your answer given above?

A: First, in regards to item 6 above, it is not sufficient to state that on such-and-such a support an error exists and then move on to the next item. It is the collective recurrence of error which holds the greater significance.

Second, to neglect an item which by any criterion is reportable (structural failures) merely because Applicants state that they will modify the support is not adequate under the provisions of 10 CFR 21.

It is obvious that Volume 1 of the Phase 3 Cygna Report is an attempt to buy off Applicants' supports as long as a piece of paper, any quality of paper, is presented by Applicants which will allow Cygna the use of the caveat "Applicants have addressed the problem." But we must keep in mind that Applicants have addressed these problems before, only to be proven wrong, as is the case with this latest batch of excuses (see above).

Beyond this, Cygna's engineering judgement has proven faulty on many occasions in the past. For example: At Tr. 12,597/17-19, Ms. Williams states that not all plants consider support masses in their stress analysis; but MSS SP-69 (to which Applicants are committed in Specification MS-46A) requires consideration of suspended masses. Although Cygna states that calculations must comply with ANSI N45.2.11, there is no mention in the report of this non-compliance; see Tr. 13,074 (see also Cygna's prefiled testimony, March 1984, and April 1984, after critique by Mr. Walsh and me).

Q: Does the above conclusion surprise you?

A: Yes, it does, for this reason -- in the last hearings, CASE never pressed their advantage but was satisfied to put Cygna on notice that the whitewash as presented in Phases 1 and 2 was not adequate nor were their initial answers to our 30 questions in regards to Phases 1 and 2. In this way, we figured that Phases 3 and 4 would represent a more diligent effort, since Cygna was aware that their every effort would be monitored.

Q: Is there any portion of Phases 3 and 4 with which you are satisfied?

A: The question is difficult -- in one respect, the report is adequate, in that the quantity of raw material presented is sufficient to make the point that Comanche Peak presents a safety hazard. But as to the broader question of "Did Cygna uncover all of the errors in the calculations which they reviewed?" I doubt it. But this answer is rhetorical, because we do not require any material beyond what exists in the Phases 1 and 2 and Phase 3 Reports to show that of 97 supports which were final "vendor certified," four fail.

If this ratio holds for the 40,000 pipe supports (not to mention cable tray supports, conduit supports, etc.), then Comanche Peak has at least 2,000 pipe supports which will fail.

Q: What are you trying to convey in this affidavit?

A: While I can't state with certainty that the errors in the calculations have all been detected by Cygna in Volumes 2 and 3 (I didn't have Volume 4) for Phase 3 of their review, I can state that a sufficient amount of raw material exists to make a judgement on the quality of the engineering.

As for Volume 1 of the Phase 3 Report, I can only state that the conclusions of Cygna represent a wish list and not an evaluation of the raw material. The raw material proves beyond a doubt that 10 CFR Part 50, Appendix B, and also the provision of ANSI N45.2.11 requiring sufficient data for calculations, are an unknown quantity at Comanche Peak, and therefore a 100 per cent review by others not dependent on the nuclear industry for their livelihood is in order. Volume 1 of the Phase 3 Cygna Report should be trashed.

The preceding CASE's Motion for Summary Disposition was prepared under my personal direction, CASE Witness Jack Doyle. I can be contacted through CASE President, Mrs. Juanita Ellis, 1426 S. Polk, Dallas, Texas 75224, 214/946-9446.

My qualifications and background are already a part of the record in these proceedings. (See CASE Exhibit 842, Revision to Resume of Jack Doyle, accepted into evidence at Tr. 7042; see also Board's 12/28/83 Memorandum and Order (Quality Assurance for Design), pages 14-16.)

I have read the statements herein, and they are true and correct to the best of my knowledge and belief.

Jack Doyle
(Signed) Jack Doyle
Date: Oct 20 1984

STATE OF _____

COUNTY OF _____

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

Subscribed and sworn before me on the 20th day of October, 1984.

IRVIN L. LERNER
NOTARY PUBLIC, State of New York
No. 52-2315660
Qualified in Suffolk County
Commission Expires March 30, 1995

Irvin L. Lerner
Notary Public in and for the
State of New York

My Commission Expires: 3/30/1985

at Babylon, N.Y. 11702

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of }
 }
TEXAS UTILITIES ELECTRIC }
COMPANY, et al. }
(Comanche Peak Steam Electric }
Station, Units 1 and 2) }

Docket Nos. 50-445-102
and 50-446-102

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CERTIFICATE OF SERVICE

By my signature below, I hereby certify that true and correct copies of
CASE'S THIRD MOTION FOR SUMMARY DISPOSITION, REGARDING LACK OF INDEPENDENCE
AND/OR CREDIBILITY OF CYGNA

have been sent to the names listed below this 2nd day of November, 1984,
by: Express Mail where indicated by * and First Class Mail elsewhere.

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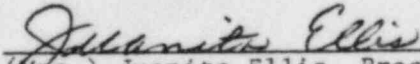
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