In addition, we have conducted audits of the three other contractors whose work TUGCO QA does not directly inspect or for whom TUGCO QA does not supervise the inspection function. No problems exist similar to those identified with Bahnson. Where applicable, these audits were conducted utilizing certified weld inspectors.

Since the CAT inspection, two audits have been performed of Bahnson's activities. The audit teams have included certified weld inspectors.

TUGCO QA will use certified weld inspectors as appropriate on audits of contractors where TUGCO QA does not perform or supervise inspection of work activities.

Q16. Mr. Vega, what is Applicants' response to the following Statement in the CAT Report?

> Contrary to 10 CFR 50, Appendix B, Criterion XVI and FSAR Section 17.1.16, audit findings related to maintenance instruction identified in 1979, 1981 and 1982 were not resolved in a timely manner (Section VIII.B.2.b.(5)(c)).

A16. (Vega) The CAT Report states that ineffective corrective action has been taken in regard to audit findings related to maintenance instructions identified in 1979, 1981 and 1982 and states that these findings were not resolved in a timely manner.

The audit findings identified in 1979, 1981 and 1982 were similar only in that they dealt with maintenance activities. The findings documented in Audit Report TCP-5 in 1979 concerned the Construction maintenance program. Those issues were resolved, and corrective action was verified during subsequent audits of the Construction program. The 1981 audit (TUG-5) concerned Startup activities and was conducted to review maintenance activities under the Startup organization's control. The July, 1981 audit (TUG-14) and June, 1982 surveillance (QSR-82-023) were conducted on the Operations maintenance program.

Although the three audits all dealt with maintenance, they involved three different organizations with different objectives, requirements, and procedures; and at three different phases of the project. Thus, it is inappropriate to combine these audits for trending purposes, and we conclude that the examples provided in the CAT Report do not support the conclusion that corrective actions are ineffective.

Q17. Mr. Tolson, what is Applicants' response to the following statement in the CAT Report:

> Contrary to 10 CFR 50, Appendix B, Criterion VI and FSAR Section 17.1.6, drawings with out-of-date revisions and drawings with damaged or unreadable title blocks were present in construction work areas (Section VIII.B.2.e).

A17. (Tolson) As stated at p. VIII-7 in the CAT Report, the subject of drawing control is a matter that requires frequent attention. Comanche Peak management has been and continues to be committed to perfecting the document control system. Plans were underway prior to the CAT inspection to move from individually controlled documents to a "Satellite" control system as a means of assuring more positive controls. Implementation of this concept has begun, and is scheduled for completion in early July.

<u>Design Change Controls and Corrective Action Systems</u>

Q18. Mr. Tolson, what is Applicants' response to the following statement in the CAT Report:

> Contrary to 10 C.F.R. 50, Appendix B, Criterion V and FSAR Section 17.1.5, procedures were not adequate to assure design changes were properly transmitted to the Quality Control organization such that an appropriate inspection could be performed (Sections IX.B.1.b.(2) and IX.B.1.c).

A18. (Tolson) This conclusion appears to stem from a concern on the part of the CAT inspector with Comanche Peak's ability to complete programmatically established tasks within the allotted time frame. We recognized several years ago that the volume of design changes required to construct the plant safely and reliably created the possibility that some inspections may not have been accomplished to the latest change. It was for this reason that we established the Design Change Verification Group and the associated procedures. The function of this Group is to ensure that hardware is installed and inspected in accordance with the latest design requirements. We are confident that this concept will uncover any loose ends and thus close the loop on this concern. Experience with this program to date indicates that the hardware has been installed and inspected in accordance with design requirements.

Q19. Mr. Tolson, what is Applicants' response to the following statement in the CAT Report?

> Contrary to 10 CFR 50, Appendix B, Criteria II and XV, and FSAR Sections 17.1.2 and 17.1.15, nonconforming conditions identified relative to some safety-related hardware installations are not being properly documented, evaluated, and dispositioned through the Corrective Action Program. (Section III.B.8, IV.B.2 and IX.B.2)).

A.19 (Tolson) An objective review of Appendix B to 10 CFR Part 50, the FSAR and the detailed implementing procedures reveals that the Comanche Peak QA Program is in total compliance with NRC requirements, including timely corrective action for repetitive conditions adverse to quality. We believe that the use of punchlists and Inspection Reports in the Comanche Peak QA Program is in full accord with applicable regulations and standards.

Q20. Messrs. Vega and Tolson, what is your overall assessment of the CAT Report and the findings in it?

A20. (Vega and Tolson) We agree with the basic conclusion in the cover letter (April 11, 1983) from the NRC to TUGCO transmitting the CAT Report that the deficiencies noted do not indicate pervasive failures to meet construction installation requirements, except for the findings regarding HVAC activities. We believe that many of the findings in the CAT Report reflect unduly stringent interpretations of regulatory requirements and in some cases factual errors. In any event, we have carefully assessed all of the findings in the CAT Report and have initiated corrective action where appropriate.

Q21. That concludes the discussion of the sixteen items listed in Appendix B to the CAT Report. There are a few additional questions for the panel. Mr. Tolson, please respond to the Board's concern that ample time and resources be devoted to final QC inspections.

A21. (Tolson) Any meaningful job has pressure associated with it. However, there has not been (nor will I permit there to be) pressure applied on my QC organization by upper management to complete Comanche Peak at the expense of quality, safety or reliability. With regard to the Board's concern that there be ample time to perform the various final inspections planned, we have organized and staffed our QA/QC efforts to comport with the schedule for Comanche Peak. We have the resources that are necessary to accomplish this objective, fully consistent with the purpose and objectives of the QA Program. Let me add, however, that I would never permit a compromise of my QA/QC responsibilities because of construction or operation schedules. We will take the time required to perform all inspections in an organized and efficient manner.

Q22. Mr. Brandt, what are your observations regarding pressure on the QC organization?

A22. (Brandt) On any construction site nearing completion, there is a certain degree of pressure exerted to meet the project construction schedule. In my arena, this pressure takes the form of calls from Construction Management for the performance of mandated QC inspections. I consider this to be a normal part of my job. I have not allowed this type of pressure to be exerted at a level any lower than myself. Inspection personnel, including lead inspectors and discipline QC Supervisors, are free from undue schedule pressure, and they perform their required inspections at a rate with which they feel comfortable. This ensures that inspections performed at the tail end of a project are of sufficient proficiency to assure the quality of construction. It has been my job to staff the QC organization with sufficient inspection personnel to support the construction schedule, and on occasion I have deliberately overstaffed to ensure that construction activity is adequately supported by inspection personnel.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
TEXAS UTILITIES GENERATING COMPANY, *et al.*	)	Docket Nos. 50-445 50-446
	)	
(Comanche Peak Steam Electric Station, Units 1 and 2)	)	(Application for Operating License)

APPLICANTS' RESPONSE TO BOARD INQUIRY REGARDING ITERATIVE DESIGN PROCESS FOR PIPING

I. NATURE OF BOARD INQUIRY

The Board has requested that Applicants provide information regarding the iterative design process for piping to satisfy the Board that there is no cause for Board *sua sponte* inquiry into that matter. The extensive examination on the record of the iterative design process at Comanche Peak has focused primarily on those aspects of the process concerning pipe supports because the issue in contention (Walsh/Doyle allegations) related to pipe support design.

Nonetheless, there is considerable evidence in the record regarding the aspects of the iterative design process concerning piping which should satisfy the Board that it should not inquire further into that process *sua sponte*. This evidence provides a full and complete answer to the Board's question and leaves open no matters that raise serious safety or environmental questions which warrant further examination in this proceeding. Thus, Applicants plan to submit further evidence on this subject at the forthcoming hearings.

II. APPLICANTS' RESPONSE TO BOARD INQUIRY

The Board has requested a response to the following question:

> Show cause why the Board need not inquire into the iterative system for designing pipes and assuring the safety of their design.

As shown below, the record contains substantial evidence directly responsive to this question. However, that evidence is not easily found and compiled, primarily because the design of piping was not an issue in controversy between the parties and thus was not of principal focus. Therefore, we have consolidated the evidence below for the Board's convenience.

A. Iterative Design Process

The record in this proceeding is replete with evidence concerning the iterative design process for piping and supports. A concise summary of the iterative design process (and the as-built design verification program) for piping and supports is set forth in Applicants' Exhibit 142, at pages 33-35.[1] As demonstrated there, the design of piping and supports is iterative in nature. The first step of the process involves the use of the original piping analysis to establish support points,

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1 "Testimony of Kenneth L. Scheppele, Roger F. Reedy, Peter S.Y. Chang, John C. Finneran, Jr. and Gary Krishnan Regarding Walsh Allegations".

types and loads. Based on this analysis, an initial effort is made to design supports. Where it is impractica to design or install supports <u>or piping</u> in the manner originally specified, a new support or <u>piping</u> scheme is required, and an update of the original <u>piping</u> analysis is performed. Construction constraints, such as interferences, also dictate changes in support or piping designs, and further reanalysis is performed. This process continues until the final as-built analysis confirms the adequacy of <u>both</u> the piping and supports. (Applicant's Exhibit 142 at 33; Tr. 4989, 7157-58.)

Applicants have presented uncontroverted testimony that the iterative design approach is very common in the nuclear industry and is an effective means of accommodating ongoing aspects of the design, fabrication and erection processes for major components. Indeed, it is impractical to design piping and supports to satisfy completely all applicable requirements the first time through the process. This practice is standard in many industries other than the nuclear industry and not just for the design and construction of piping systems, but for other major components as well. (Applicants' Exhibit 142 at 34; Tr. 4969-70, 5184, 7155-57).

In sum, the piping and pipe support aspects of the iterative design process, and the utility and effectiveness of such a process in complex construction projects, has been fully covered on the record. In view of this evidence, Applicants submit that there is no need for further Board inquiry into the nature of the iterative design process.

B. As-Built Design Verification of Piping and Supports

An integral part of this iterative design process is a comprehensive as-built program and final ASME Code verification program designed to assure the adequacy of the final support and piping system for Comanche Peak. The as-built program is established in accordance with the requirements of NRC I&E Bulletin 79-14 (NRC Exhibit 201C). In short, the program includes the following efforts:

1. All safety-related piping systems are surveyed in the as-built condition to determine piping geometry and support locations and functions.

2. This information, along with copies of as-built pipe support drawings, is forwarded to the responsible piping stress analysis organization for evaluation.

3. All stress analyses are redone utilizing the as-built information, and if appropriate, the piping is certified to the proper code allowables. If necessary, redesign and rework of supports are performed.

(Applicants Exhibit 142 at 34-35).

The as-built program is established on a stress problem basis. Specifically, the piping systems are separated into individual stress problems which include a piping and support system from one anchor point to another. The architect/engineer and the nuclear steam supply system supplier have defined the limits of the stress problems. All as-built documents regarding piping and supports for a particular stress problem will be gathered once all supports in that area are installed. (Tr. 5286-88.)

Upon completion of gathering the documents for a stress problem, the documents are forwarded to the QA/QC department. QA/QC survey teams verify the location of the piping and supports as indicated on the drawings in accordance with written procedures. Where differences in drawings and as-built configurations exist, they are noted on the drawings. The documents are then returned to the technical services group for forwarding to the appropriate pipe stress analysis organization. Simultaneously, the documents are formally revised to reflect the survey information. (Tr. 5289-90, 7147-48; Applicants' Exhibit 150).

The pipe stress analysis group utilizes the as-built stress problem package to generate an analysis which establishes new as-built loads for each support. The results of this analysis are forwarded to the technical services group for distribution to the appropriate pipe support design organizations. The loads for the supports are then analyzed in accordance with the as-built piping analysis loads. (Tr. 5289-91, 7149-54.)

This entire as-built program is coordinated by the Comanche Peak Project Engineering Technical Services Group and performed in accordance with established procedures. (Tr. 5289-91.) A complete description of this program is set forth in Applicants' Exhibit 151, Engineering Instruction CP-EI-4.5-1, "General Program for As-Built Piping Verification" (Tr. 5286). This instruction describes the scope, procedures and organizational interfaces for the verification and certification of the as-built designs of piping and supports in accordance with the provisions of I&E Bulletin 79-14. In addition, detailed procedures to be utilized by the Quality Assurance personnel to verify the adequacy of documention associated with the piping stress problems used in the As-Built Piping Verification Program have also been established (Applicants' Exhibit 150). This comprehensive program provides the required high level of confidence that piping and supports at Comanche Peak will satisfy all applicable regulatory requirements in their as-built condition.

Further, the Board should note that confirmation by the NRC Staff of the effective implementation of this program has occurred both with respect to pipe supports and piping in that (1) (with respect to the supports) the NRC Special Inspection Team found that <u>every</u> support of a random sample of 100 supports which were vendor certified satisfied all applicable design attributes (NRC Exhibit 207, at 54-58) and (2) (with respect to piping) the NRC Special Inspection Team inspected and was satisfied with the Gibbs & Hill review of piping stress problems and found that the review was performed by experienced engineers through exhaustive check and recheck (Tr. 7019-23).

Finally, we note that the final as-built piping verification process has progressed to the point that the Board should have no concern regarding the scheduling aspects of that process. As previously noted, this process precedes the final pipe support verification process for each pipe stress problem. Thus, in view of the substantial progress made in the support verification area and the time frame anticipated for conclusion of that aspect of the process[2], it is obvious that the piping verification process is also well along and can be completed in the time frame contemplated.

In view of the extensive record described above regarding the As-Built Verification Program for piping and supports, and the favorable conclusions reached by the NRC Staff regarding its implementation, there is no basis for the Board to conduct further inquiry into any aspect of that program.

C. Piping and Support Stress Analysis Group Interfaces

To illustrate the iterative design process, Applicants submitted a sample package of a pipe support design drawing . These drawings, and the attendant discussion on the record, provide a clear picture of the interfaces between the piping and support analysis groups. (Applicants' Exhibit 147.)

As Applicants testified, the original design drawing for this particular support was received from Applicants' pipe support engineer. The second iteration of this document simply involves the relabeling of the approval block. The label pasted on top of the original vendor's label is used to supply construction related information by the field survey team (Applicants' Exhibit 147 at 1-3; Tr. 5194, 5200, 5399-5400). The next step in the process involves the notation of comments on the

2 See "Affidavit of John C. Finneran Regarding Board Inquiries Concerning Status of Pipe Support Design Verification and Unstable Supports," submitted simultaneously with this pleading.

drawing by the field survey team (Applicants' Exhibit 147 at 3; (Applicants' Exhibit 147 at 3; Tr. 5194). At this point, the drawing (with the surveyor's comments) is sent to the appropriate analysis organization for final as-built piping verification. Simultaneously, the same drawing is sent to the pipe support design review group. (Applicants' Exhibit 147 at 4; Tr. 5195-96.) Finally, the organization performing the support as-built analysis compares the support with the final as-built piping stress loads (Applicants' Exhibit 147 at 7; Tr. 5196-97). This analysis then is verified by the design review group and certified by the engineer of the vendor organization, as indicated by the vendor certified stamp in the center of the drawing. In short, a carefully structured interface between the piping and pipe support design and review groups is maintained to assure that each pipe stress package (piping and supports) is reviewed and re-reviewed until satisfactory. (See Tr. 4915-16.) Applicants submit that there is no basis for requiring further inquiry into these interfaces.

III. CONCLUSION

Applicants submit that there is no basis for further inquiry into the iterative design process or the As-Built Verification Program. Indeed, there is no evidence that upon completion of the iterative design process either the piping or pipe supports will not satisfy all applicable design requirements. Given this state of the record, the Board should proceed to an initial decision on this matter without taking further evidence.

Respectfully submitted,

Nicholas S. Reynolds

William A. Horin

DEBEVOISE & LIBERMAN
1200 Seventeenth St., N. W.
Washington, D. C. 20036
(202)857-9817

Counsel for Applicants

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